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NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

Metric Development During the Reorganization of the Supply Chain Management Center

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By: Douglas W. Burkman
December 2003

Advisors: Kenneth H. Doerr
Kenneth J. Euske

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METRIC DEVELOPMENT DURING THE REORGANIZATION OF THE SUPPLY CHAIN MANAGEMENT CENTER

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Submitted in partial fulfillment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

NAVAL POSTGRADUATE SCHOOL
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METRIC DEVELOPMENT DURING THE REORGANIZATION OF THE SUPPLY CHAIN MANAGEMENT CENTER

ABSTRACT

This MBA Project documents a case study of an ongoing reorganization effort at the Supply Chain Management Center (SCMC), Marine Corps Logistics Command (MARCORLOGCOM), and their use of the Supply Chain Operations Reference (SCOR) Model and the Balanced Scorecard (BSC) to develop performance metrics based on sound processes. The primary focus was on the SCMC. In addition, the Source Management Department, one of SCMC's subordinate units, was a secondary focus. Background information about SCOR and BSC were reviewed, as well as what has been implemented thus far with SCMC. Finally, considerations regarding the assessment and management of suppliers were offered as recommendations.

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I. INTRODUCTION

A. PURPOSE

Before the current Supply Chain Management Center (SCMC) reorganization effort, SCMC did not have a metric system in place to measure supply chain performance. This author explored two influences and initiatives, namely the Supply Chain Operations Reference (SCOR) model and the Balanced Scorecard (BSC), that are being pursued to correct this deficiency.

This case study sought to clarify the "why" and "how" of a reorganization process not yet well understood at many levels of the supply chain within the Marine Corps, but which will be greatly affected by such process changes. This case study followed commonly accepted methodology, as described in Yin (1994).

As the study was explanatory, particular attention was paid to defining the scope and units of analysis. However, while existing literature on the SCOR model and the Balanced Scorecard were briefly reviewed, it was not the intention of this study to validate any existing theory, or support any particular proposition about SCOR, or the Balanced Scorecard technique. Rather, the study focused on the process of change, seeking to provide an understanding through description of the transformation process as it was undertaken by SCMC.

B. SCOPE

The scope of the study was limited to SCOR level processes within SCMC, including the development of performance metrics within the SCOR-based organizational

structure. The primary unit of analysis in this case study was the SCMC. The intent was to develop an integrated understanding of transformation as it affects SCMC as a whole. Furthermore, the Source Management Department's SCOR and metric development was also reviewed briefly.

Finally, it must be emphasized from the outset that SCMC's SCOR and metric development are only partially complete. As of November 2003, much work was still continuing and will continue for the next several months or so.

C. METHODOLOGY

Due to the significant causal relations between the SCOR model and the BSC approach, the general strategy of this case study was to describe that relationship, and how it drove the reorganization of the SCMC. The SCOR model led SCMC to both a physical and process reorganization. Furthermore, SCMC hopes the BSC technique will help SCMC frame its metric development, coinciding with the SCOR model's foundation. Within this strategy, explanation building was the technique used to analyze the case.

Data was collected via personal/electronic mail interviews and the study of related documents. Personal interviews were conducted during four trips to SCMC, located in Albany, Georgia. Two-day trips were completed in June and July of 2003. Four-day trips were conducted in September and October of 2003. The personal interviews were both unstructured and semi-structured. Early interviews were used mostly to develop a grounded framework for the study of the SCOR level processes within SCMC.

Later, interviews were targeted at developing a full description of the transformation effort at SCMC.

Interviews were recorded and transcribed. The interviews were used to generate descriptions and develop discussion in the report. However, transcriptions are not provided in this report, nor was a permanent record of them kept.

D. ORGANIZATION

First, the SCOR model is described. Second, Kaplan and Norton's Balanced Scorecard, as well as the Integrated Logistics Concept (ILC) SCOR card are explained. Third, the impetus for implementing such initiatives is clarified. Fourth, SCMC's implementation of the SCOR model down to the Source Management Department is discussed. Fifth, SCMC's metric development is described. Finally, recommendations are made to develop metrics for assessing supplier performance.

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II. OVERVIEW AND BACKGROUND OF THE SCOR MODEL

The SCOR model was first developed and released by the Supply Chain Council (SCC) in 1996. The most up-to-date SCOR model version 6.0 was published in April 2003. The SCC is an independent, global, not-for-profit corporation comprised of practitioners across the manufacturing, distribution, and retail industries as well as technology suppliers and implementers, academicians, and government organizations (e.g., Marine Corps). [Ref. 1: p. 1]

The Model uses the management process building blocks of Plan, Source, Make, Deliver, and Return to describe logistics chain processes. By using a common set of terms and definitions, disparate industries and those of varying complexities and sizes can all use the SCOR Model. The Model is typically used to map five stages of the supply chain process (i.e. the movement of products & information from the suppliers of an organization's suppliers to the customer of their customers) as viewed in Figure 1. [Ref. 22: p. 3] It is also used to map the processes within a single organization (Figure 2) [Ref. 1: p. 9], as will be explained for SCMC later in the paper.

A. LIMITATIONS OF SCOR

The SCOR model has limitations within business processes and within organizations. Activities not addressed include: sales and marketing, product development, and some areas of post-delivery customer support. Also, the Model does not discuss human resources, training, and quality assurance. The SCC agrees there are other highly qualified organizations, which adequately conduct programs in these areas that are either absent or

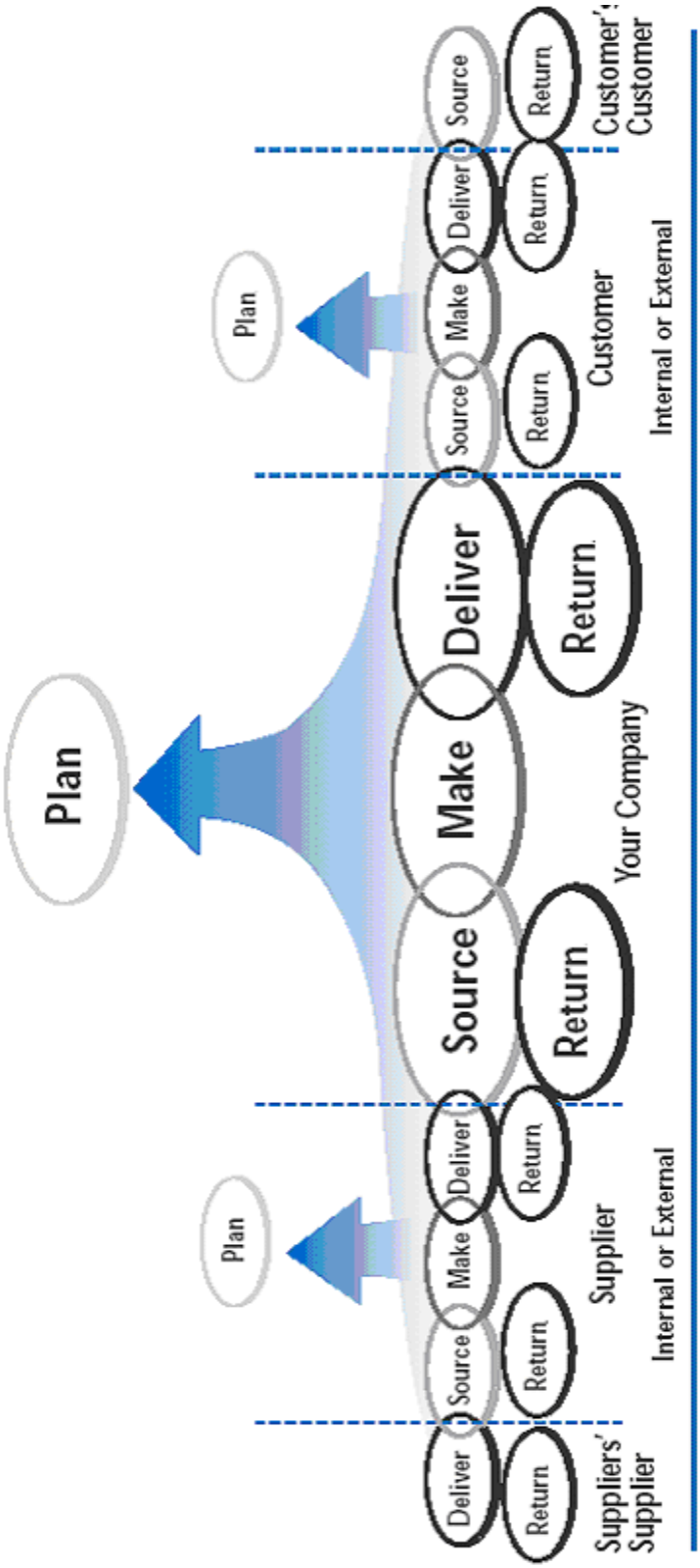

Figure 1. Supply Chain-level Mapping (From: Ref. 22)

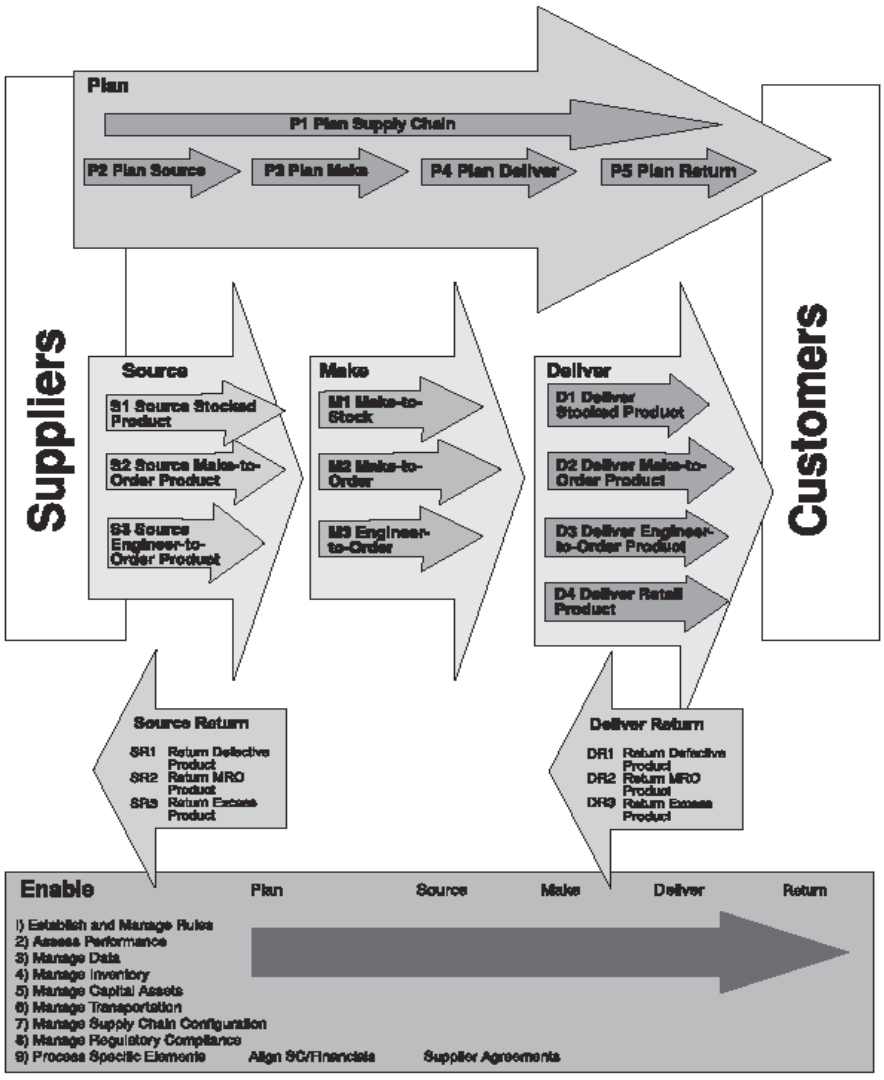

Figure 2. Organization-Level Mapping (From: Ref. 22)

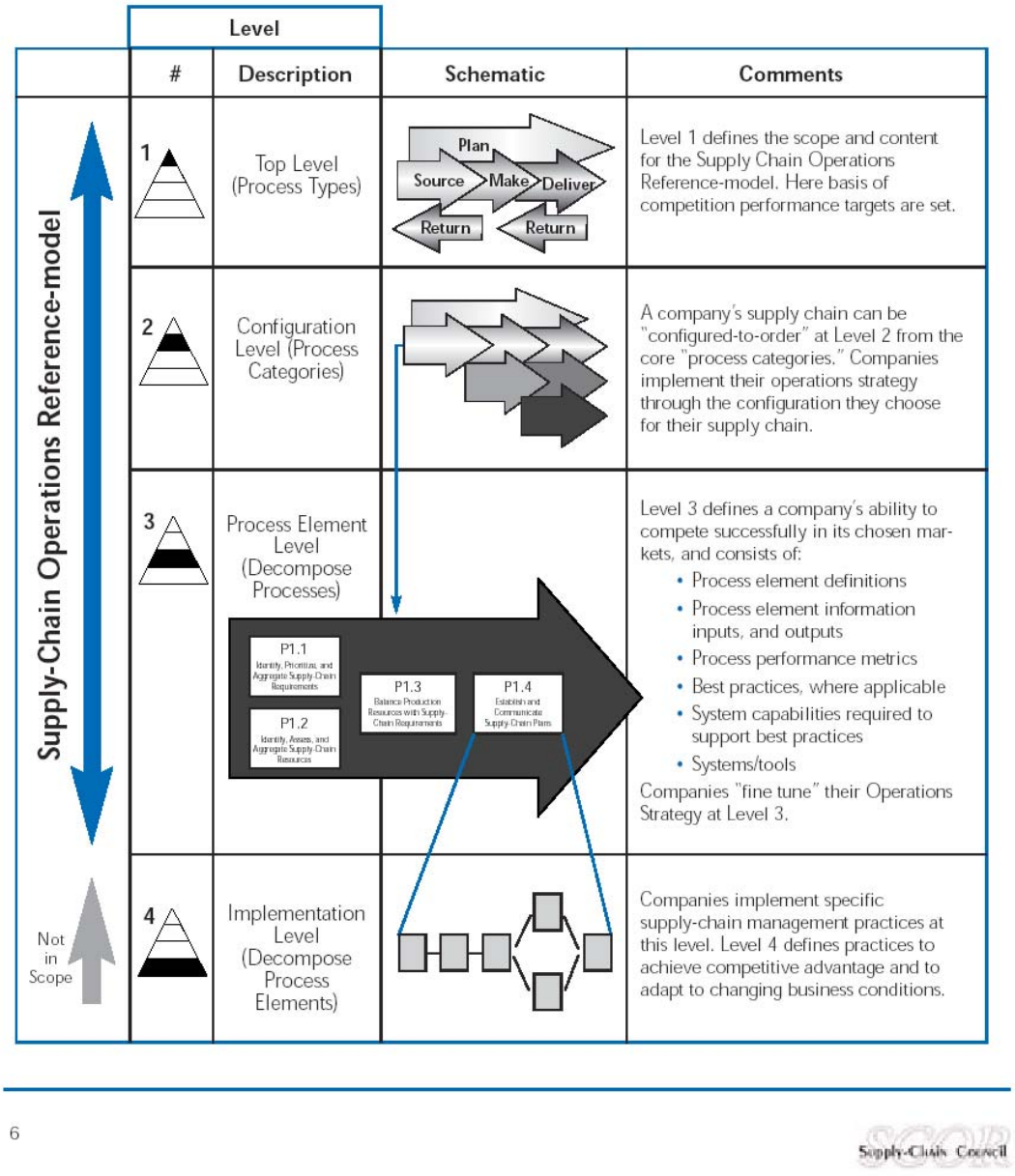
SCOR Contains
Three Levels of Process Detail
Level
#
Description
Schematic
Comments
Supply-Chain Operations Reference-model
1
Top Level (Process Types)
Plan
Source
Make
Deliver
Return
Return
Level 1 defines the scope and content for the Supply Chain Operations Reference-model. Here basis of competition performance targets are set.
2
Configuration Level (Process Categories)
A company's supply chain can be "configured-to-order" at Level 2 from the core "process categories." Companies implement their operations strategy through the configuration they choose for their supply chain.
3
Process Element Level (Decompose Processes)
P1.1
P1.2
P1.3
P1.4
Level 3 defines a company's ability to compete successfully in its chosen markets, and consists of:
• Process element definitions
• Process element information inputs, and outputs
• Process performance metrics
• Best practices, where applicable
• System capabilities required to support best practices
• Systems/tools
Companies "fine tune" their Operations Strategy at Level 3.
Not in Scope
4
Implementation Level (Decompose Process Elements)
Companies implement specific supply-chain management practices at this level. Level 4 defines practices to achieve competitive advantage and to adapt to changing business conditions.
6
Supply-Chain Council

Figure 3. Three Levels of SCOR (From: Ref. 22)

minimized in the Model. Additionally, the SCOR model only maps out processes through level three (see Figure 3). Organizations still need to map out level four processes and beyond, as each organization must address their own unique activities. [Ref. 1: p. 3] Furthermore, the Model does not address material repair activity, but the SCC is working to incorporate this into the Model. [Ref. 2: p. 109] In the end, the flexibility already exists to adapt the Model to an organization's needs as the Marine Corps has done in adding Maintain to be interchangeable with Make.

B. THE BUILDING BLOCKS OF THE SCOR MODEL

Within the SCOR model, P depicts Plan, S depicts Source, M depicts Make or Maintain, D depicts Deliver, R depicts Return, and E depicts Enable. A letter with no number represents a level one process. A combination such as P1 represents a level two process. And, a notation such as P1.1 represents a level three process. [Ref. 1: p. 5]

Level one is defined by the five core management processes of plan, source, make, deliver, and return as shown in Figure 4 [Ref. 22: p. 7]. For level two, three process types also in Figure 4 further define the core processes: planning (e.g., P2 Plan Source), execution (e.g., S1 Source Stocked Product), and enable (e.g., ES Enable Source). The examples given represent process categories. In level three, the process categories are delineated by distinct inputs, outputs, and a basic logic flow of process elements as viewed in Figure 5 [Ref. 22: p. 10]. SCOR levels four and below describe the process elements in even greater detail and are organization unique as illustrated in Figure 6 [Ref. 22: p. 12].

C. PURPOSE OF THE SCOR MODEL

The Supply Chain Council created the SCOR model to allow organizations to do the following: [Ref. 2: pp. 108-109]

- Communicate by using common terminology and standard descriptions
- Leverage metrics and benchmarking to determine performance goals, set priorities, and quantify the benefits of process change
- Understand practices that yield the best performance
- Understand the supply chain management (SCM) process and evaluate overall performance
- Identify the best software tools for their process requirements

D. SOME KEYS TO SCOR

In this section, the author acknowledges the many illustrations provided by SCMC's SCOR evangelist (a term commonly used by the SCC and SCMC), Mike Lawrence, to enable further understanding.

1. Supply Chains

Ultimately, the primary purpose of SCOR is to describe and model supply chains. But, an organization must first establish how they will identify their supply chains. [Ref. 1: p. 2] Supply chains may be categorized in numerous ways, to include: product groupings, geography, profit center/ cost center, organizational, customer, and supplier. [Ref. 19: p. 54] This becomes more apparent to an organization as they put individual product supply chains on a physical map (Figure 7). [Ref. 22: p. 18]

Process Categories

Defined by the Relationship Between a SCOR Process and a Process Type

"SCOR Configuration Toolkit"

		SCOR Process					
		Plan	Source	Make	Deliver	Return	
Process Type	Planning	P1	P2	P3	P4	P5	Process Category
	Execution		S1- S3	M1- M3	D1 - D4	SR1-SR3 DR1-DR3	
	Enable	EP	ES	EM	ED	ER	

Practitioners select appropriate process categories from the SCOR configuration toolkit to represent their supply-chain configuration(s).

Level 1 Process Definitions

SCOR Is Based on Five Core Management Processes

SCOR Process	Definitions
Plan	Processes that balance aggregate demand and supply to develop a course of action which best meets sourcing, production and delivery requirements
Source	Processes that procure goods and services to meet planned or actual demand
Make	Processes that transform product to a finished state to meet planned or actual demand
Deliver	Processes that provide finished goods and services to meet planned or actual demand, typically including order management, transportation management, and distribution management
Return	Processes associated with returning or receiving returned products for any reason. These processes extend into post-delivery customer support

Supply-Chain Council

7

Figure 4. Process Types and Definitions (From: Ref. 22)

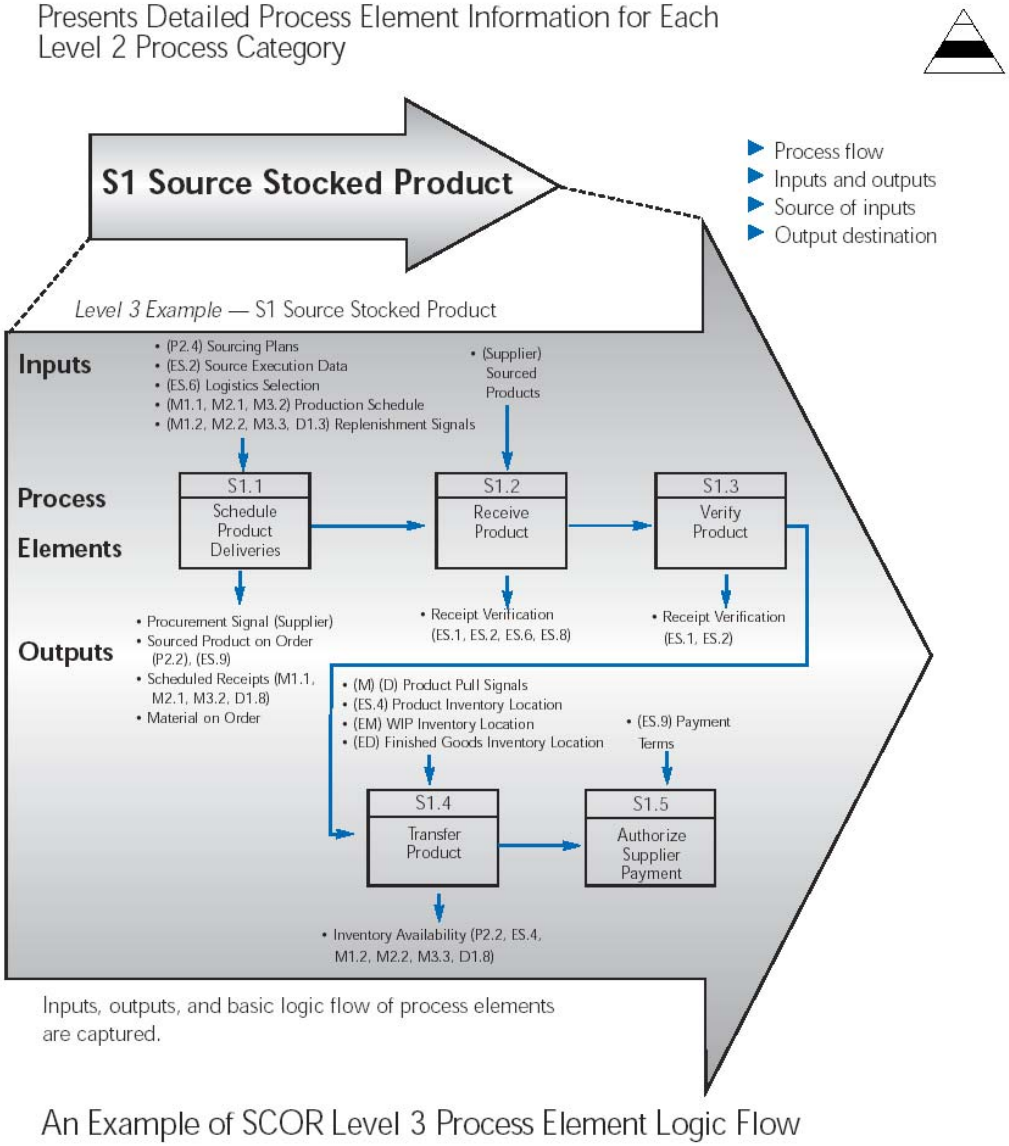
SCOR Level 3
Presents Detailed Process Element Information for Each Level 2 Process Category
S1 Source Stocked Product
Process flow
Inputs and outputs
Source of inputs
Output destination
Level 3 Example — S1 Source Stocked Product
Inputs
• (P2.4) Sourcing Plans
• (ES.2) Source Execution Data
• (ES.6) Logistics Selection
• (M1.1, M2.1, M3.2) Production Schedule
• (M1.2, M2.2, M3.3, D1.3) Replenishment Signals
• (Supplier) Sourced Products
Process Elements
S1.1 Schedule Product Deliveries
S1.2 Receive Product
S1.3 Verify Product
Outputs
• Procurement Signal (Supplier)
• Sourced Product on Order (P2.2), (ES.9)
• Scheduled Receipts (M1.1, M2.1, M3.2, D1.8)
• Material on Order
• Receipt Verification (ES.1, ES.2, ES.6, ES.8)
• Receipt Verification (ES.1, ES.2)
• (M) (D) Product Pull Signals
• (ES.4) Product Inventory Location
• (EM) WIP Inventory Location
• (ED) Finished Goods Inventory Location
• (ES.9) Payment Terms
S1.4 Transfer Product
S1.5 Authorize Supplier Payment
• Inventory Availability (P2.2, ES.4, M1.2, M2.2, M3.3, D1.8)
Inputs, outputs, and basic logic flow of process elements are captured.
An Example of SCOR Level 3 Process Element Logic Flow
10
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Figure 5. Level Three Detail (From: Ref. 22)

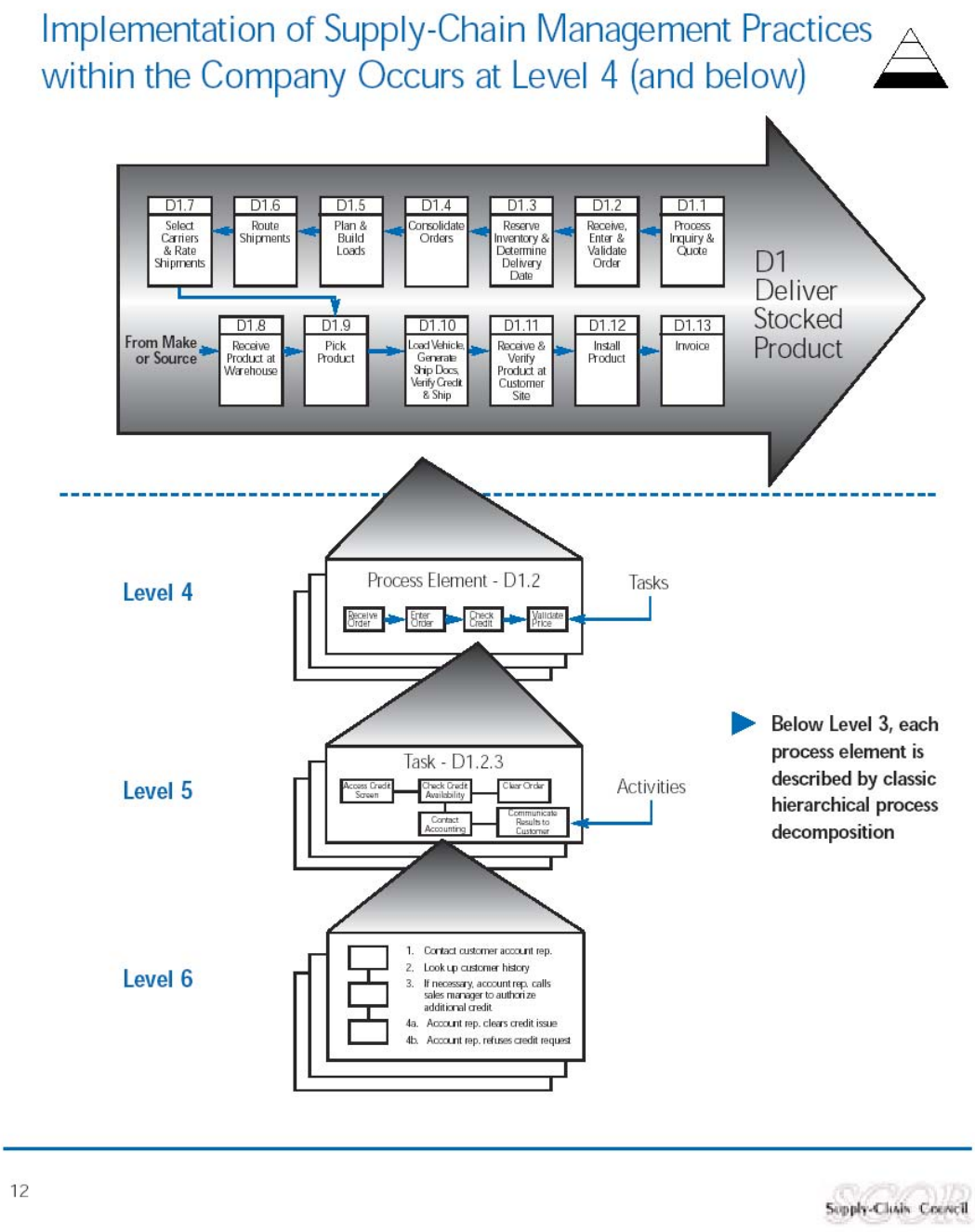
Implementation of Supply-Chain Management Practices within the Company Occurs at Level 4 (and below)
D1.7 Select Carriers & Rate Shipments
D1.6 Route Shipments
D1.5 Plan & Build Loads
D1.4 Consolidate Orders
D1.3 Reserve Inventory & Determine Delivery Date
D1.2 Receive, Enter & Validate Order
D1.1 Process Inquiry & Quote
From Make or Source
D1.8 Receive Product at Warehouse
D1.9 Pick Product
D1.10 Load Vehicle, Generate Ship Docs, Verify Credit & Ship
D1.11 Receive & Verify Product at Customer Site
D1.12 Install Product
D1.13 Invoice
D1 Deliver Stocked Product
Level 4
Process Element - D1.2
Receive Order
Enter Order
Check Credit
Validate Price
Tasks
Level 5
Task - D1.2.3
Access Credit Screen
Check Credit Availability
Clear Order
Contact Accounting
Communicate Results to Customer
Activities
Level 6
1. Contact customer account rep.
2. Look up customer history
3. If necessary, account rep. calls sales manager to authorize additional credit
4a. Account rep. clears credit issue
4b. Account rep. refuses credit request
Below Level 3, each process element is described by classic hierarchical process decomposition
12
SCOR
Supply-Chain Council

Figure 6. Level Four and More (From: Ref. 22)

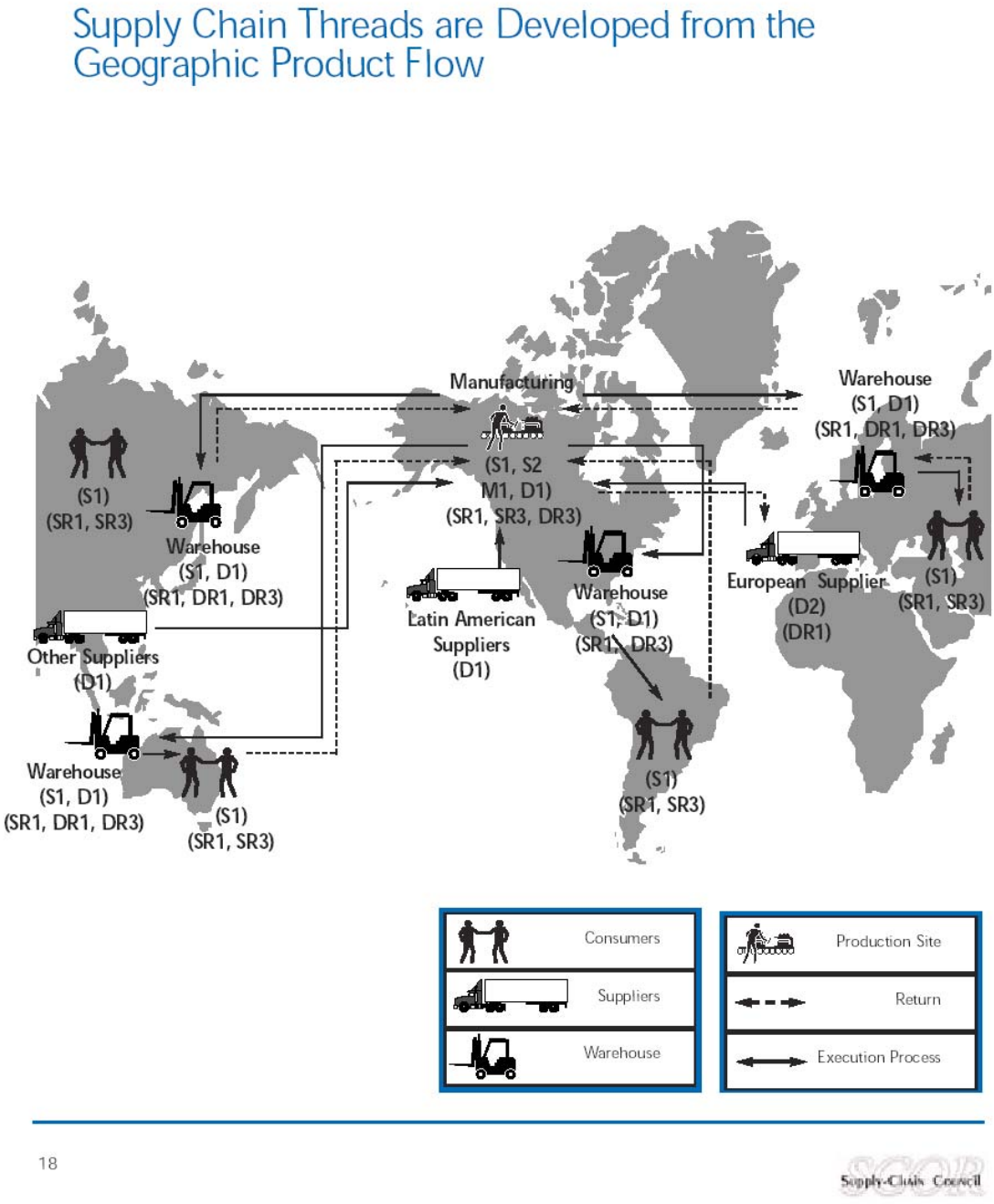

Figure 7. Physical Map (From: Ref. 22)

Considerations in determining supply chains should include some of the following examples of thought-provoking illustrative questions. If a circuit card can be shipped in an envelope, but an engine must be shipped by tractor-trailer with forklift support, should they be categorized in the same supply chain and measured against one another by the same standard? Likewise, should a circuit card and engine be in the same supply chain and held to the same standard when comparing Repair Cycle Time (RCT)? Should a circuit card being shipped to Camp Pendleton, CA from Albany, GA be in the same supply chain and held to the same standard of delivery time as a circuit card being shipped to Camp Lejeune, NC from Albany, GA? Finally, should a truck shipped by tractor-trailer be in the same supply chain and held to the same standard as a tank being shipped by rail? Distinct shipping processes, geographical locations, and transportation modes highlight some of the unique characteristics to be considered in identifying supply chains. [Refs. 1, 7, 19]

2. Mapping the Process

Having identified the supply chains, the activities/processes within those supply chains need to be mapped and described. A collaborative effort should transpire from the top down in mapping the activities of the supply chain to a flow chart, particularly levels three and below. As this evolution takes place, further characteristic analysis of the supply chain will also occur. Many questions will arise. For example, who is the supplier? Who is the supplier’s supplier? Are they the sole source? Who is the customer? What is the customer’s desire? What are the customer’s demands? Are there spikes

in the demands? These are just a few of many questions that should be explored and drive the development in mapping the processes. [Refs. 1, 7, 19]

3. As-Is

When the process mapping is completed, performance metrics need to be identified. In order to identify the "As-Is" performance level of a given metric, the performance data must be visible and accessible. For instance, if the metric identified is forecast accuracy and the current performance is 50%, this represents the "As-Is" state of the forecast accuracy process. [Refs. 1, 7, 19]

Sometimes, other considerations must be kept in mind when determining the "As-Is". For example, the inventory of circuit cards for a particular radio may be very high compared to the inventory required for a given service level. Closer investigation reveals that the circuit card supplier went out of business and the item manager purchased the remaining inventory. With the larger inventory of circuit cards, the item manager is seeking to give himself some additional lead-time to find another supplier of circuit cards or to find another solution. Such information should be considered when determining the "As-Is" state, so that such a situation is not overlooked. This is just one example of the level of detail required in calculating the "As-Is" state of the supply chain. [Refs. 1, 7, 19]

4. To-Be

After establishing the “As-Is”, a “To-Be” target or objective should then be established. This target may be based on a competitor’s performance, best in class, demands of your customer, or several other possibilities. When this target has been determined, an analysis of why there is a difference between the “As-Is” and the “To-Be” should take place. For example, if the “To-Be” target for forecast accuracy was set at 85% and the “As-Is” had already been determined at 50%, a gap analysis would then be performed to identify what is causing the difference. This analysis would be process and technologically-oriented. The SCOR model offers suggestions of best business practices and processes to be implemented for success. These would enable the organization to implement what needs to occur in order to achieve the “To-Be” target. When identifying another organization as being responsible for a discrepancy in the supply chain, an organization should always ensure that their own processes are sound and not contributing to the deficiency before seeking to correct another member of the supply chain. [Refs. 1, 7, 19]

The analysis may also determine that the forecasting model is sub-standard. In this case, the process should remain the same, but the enabler would need to be upgraded or replaced. In the end, base-lining work must be done to establish an “As-Is” state, in order to set a “To-Be” objective and begin the effort towards that accomplishment. [Refs. 1, 7, 19]

In the end, not all items of each supply chain will have all the same or similar characteristics. Hence, it should be noted that not all items would perform at the same standard, therefore the distinguishing characteristics within a supply chain should always be considered during supply chain performance analysis. Consequently, an organization may have to make changes to a process for a specific item within a supply chain to increase its performance capability. [Refs. 1, 7, 19]

III. BACKGROUND ON METRIC PHILOSOPHIES

A. SCOR CARD

In 2002, when the Marine Corps began to use the SCOR model to map its logistical processes, ILC began to work with the SCC to develop a logistical scorecard based on the performance attributes defined by the metrics within the Model. To develop such a scorecard, the ILC followed a specific four-step methodology in doing so. First, they sought to understand the Marine Corps mission, the priorities of the logistical enterprise, and the key objectives of the leadership. The second step was to define key characteristics of the logistics chain that were aligned with the enterprise mission and objectives, and identify level one metrics that would indicate performance in those areas. Third, they prioritized the level one metrics and decomposed them into a set of hierarchical diagnostic metrics. The fourth step was to use those metrics to develop and fine-tune business processes to support the overarching enterprise goals and objectives. [Ref. 5: p. 17]

The key identified characteristics of the logistics chain were the five performance attributes of the SCOR model and an additional DOD-unique attribute entitled readiness (Figure 8). With the assistance of the SCC, the six characteristics were defined and the representative metric chosen as the following [Refs. 2, 3, 4]:

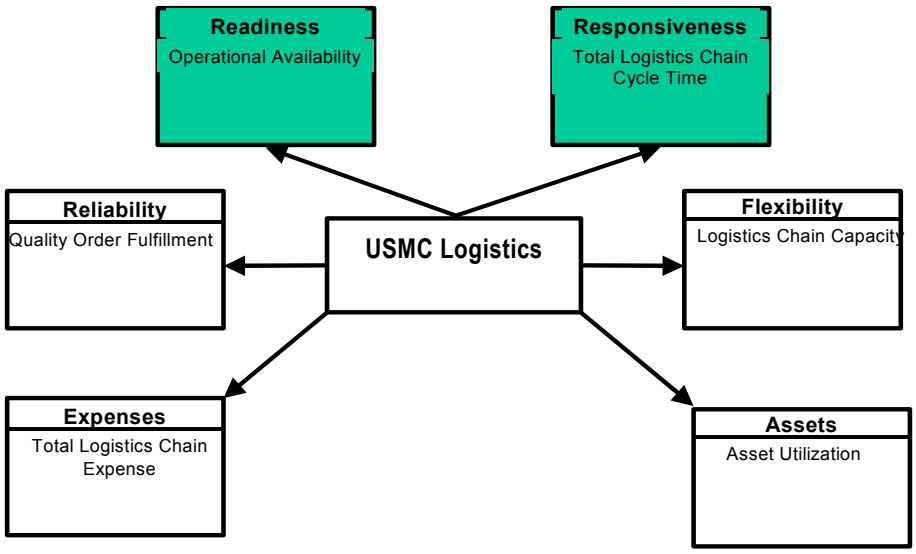

Figure 8 ILC's Balanced SCOR card (From: Ref. 4)

-**Reliability:** -The performance of the logistics chain in delivering the correct product to the correct place, at the correct time, in the correct condition and packaging, in the correct quantity, with the correct documentation, and to the correct supported unit. This is an adapted definition from the SCC's SCOR model attribute of Supply Chain Delivery Reliability. It is worth noting that this is a somewhat unusual definition of reliability. Webster's New Collegiate Dictionary defines reliability as "the extent to which an experiment, test, or measuring procedure yields the same results on repeated trials." And, in measurement, reliability usually refers to a property of repeatability and stability. [Ref. 43: p. 145] ILC and the SCC have specifically stated that this attribute is a

measure of accuracy and timeliness. The tier-one metric chosen was Quality Order Fulfillment (see Appendix A).

-**Responsiveness:** -The velocity at which a logistics chain provides products to supported units from the time a request is made to the time of delivery. The tier-one metric selected was Total Logistics Chain Cycle Time (see Appendix A).

-**Flexibility:** -The agility of a logistics chain when responding to sudden changes in supported unit demand. The tier-one metric identified was Logistics Chain Capacity to handle sudden demand surges (see Appendix A).

-**Readiness:** -Equipment readiness captures how often equipment is mission ready, but is only one of four elements of readiness (the other three being organization/personnel, force projection, and training). Readiness is a military-unique metric and is typically associated with a unit's percentage of equipment not dead lined, but has not yet been formally defined. Operational Availability was identified as this attribute's tier-one metric (see Appendix A). It is noteworthy that this situation introduces two quite problematic issues. Without a definition of readiness, it is impossible to assess the validity of the selected measure of the construct. [Ref. 44: pp. 17, 60] That is, it is impossible to assess whether readiness, as the construct is defined, is an appropriately explanatory term for the use we intend to make of it (because it has not been defined); and, secondly, it is impossible to assess whether Operational Availability accurately reflects our definition of readiness (again, because it has not been defined).

Operational Availability was identified as this attribute's tier-one metric (see Appendix A).

-**Assets:** -The effectiveness of an organization in managing assets to support demand satisfaction. The tier-one metric chosen was Asset Utilization (Appendix A).

-**Expenses:** -The expenses associated with operating the Logistics chain. The tier-one metric selected was Total Logistics Chain Expense (see Appendix A).

The specific tier-one metrics were identified by ILC using a two-pronged approach referred to as primary research and secondary research. Primary research was a collaborative effort with Penn State University. Leading firms in supply chain management were identified, after which the list was screened for only those being most relevant to the Marine Corps. Site visits and interviews were then conducted with these selected firms to better "understand why they excel in supply chain management, how their different supply chain management processes work, the tools and intelligence they use to make them a best-in-class company, and the metrics they use." [Ref. 4: p. 1] Primary research also included an investigation of DOD and Marine Corps use of metrics. The key element of secondary research was a literature review of numerous books and publications related to supply chain management. This proved helpful in highlighting insights not yet covered by the primary research. From the primary and secondary research efforts, the best tier-one metrics were selected as they fit among the SCOR attributes and then developed. [Ref. 4: pp. 1-2]

In researching metrics, ILC discovered further distinguishing characteristics of metrics. Tier-one

metrics are referred to as measurement metrics, or high-level strategic metrics. Each measurement metric is built from lower level metrics called diagnostic metrics. For example, Total Fulfillment Cycle Time, a tier-one measurement metric, is calculated by adding Request Cycle Time and Order Fulfillment Cycle Time, two tier-two diagnostic metrics. And, as the name implies, diagnostic metrics are to be used for problem diagnosis and correction. [Ref. 4: p. 8]

Upon determining the tier-one metrics, tier-two metrics were identified to calculate the tier-one metrics. Thereafter, a cascading effect took place: tier-three metrics were identified to calculate the tier-two metrics and so on. [Refs. 4: p. 9]

If this metric framework was mandated by the Commandant of the Marine Corps and institutionalized through a series of steps, all units in the Marine Corps would participate in providing input for the computation of these tier-one metrics. [Ref. 4: pp. 9-11]

B. BALANCED SCORECARD

In the 1980’s, sixteen distinguished researchers from the Massachusetts Institute of Technology (MIT) examined eight production industries within the United States and came to the conclusion that the United States was losing its dominant position in the world economy due to profound defects in the country’s private sector culture. This group subsequently recommended that industry develop techniques to measure and improve the efficiency and quality of the production process and to identify opportunities for progressive improvements in its

performance. Specifically, they challenged manufacturers to develop new measures on three performance criteria: quality, cost, and delivery. [Ref. 10: p. xi]

In January 1989, Harvard University hosted a colloquium wherein the conference delegates (academicians and practitioners from more than 25 companies) identified specific improvements needed to develop a valuable performance measurement framework:

- Focus on the customer
- Forge tighter linkages between plant and local department measures
- Be more dynamic, capable of changing when customer expectations or strategies change
- Translate flexibility into specific measurements
- Link operations to financial results

With such an acknowledged challenge, various groups present sought to develop a framework. [Ref. 10: p. xii] During this period of time, Robert Kaplan and David Norton, in working with dozens of companies, developed the most prominent framework that would be used by hundreds of companies and organizations over the next decade. [Ref. 12: p. 2]

In summarizing their framework, Kaplan and Norton explain:

> The Balanced Scorecard complements financial measures of past performance with measures of the drivers of future performance. The objectives and measures of the scorecard are derived from an organization's vision and strategy. The objectives and measures view organizational performance from four perspectives: financial, customer, internal business process, and learning and growth. These four perspectives provide the

framework for the Balanced Scorecard. (Figure 9) [Ref. 9: p. 8]

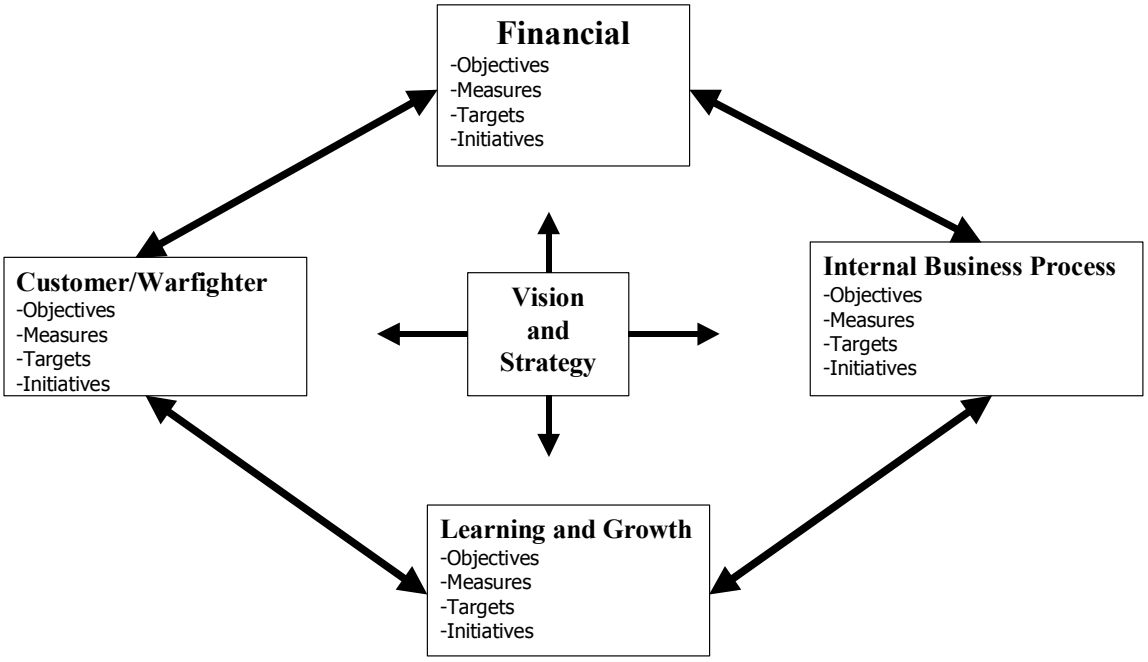

Figure 9. Balanced Scorecard (After: Ref. 9).

C. CREATING A BALANCED SCORECARD

To create a balanced scorecard, an organization must be able to translate their mission and strategy into operational objectives and measures. This requires an architect to frame and facilitate the process, and ensure relevant information is used in the scorecard. The architect is typically a senior staff manager in the organization. To be successful, the senior executive leadership (client) must actively sponsor and participate

in the process; otherwise, the effort will fail. This should not be a staff-led initiative. "The client must be totally engaged in the development process, since the client will assume ultimate ownership of the scorecard and will lead the management processes associated with it." [Ref. 9: p. 299] To create the scorecard, four primary steps will occur. [Ref. 9: pp. 294-300]

1. Defining the Measurement Architecture

The appropriate organizational unit must first be selected. A corporation is seen as too diverse for a scorecard project. However, one of its strategic business units (SBUs) is usually ideal. Typically, the SBU would have products, customers, marketing, distribution channels, production facilities, and possibly more in its spectrum of activities. [Ref. 9: pp. 300-302]

The architect then begins learning about the SBU's relationship with other SBUs in the corporation. He conducts interviews with senior executives regarding financial objectives for the SBU, overriding corporate themes, and linkages to other SBUs. Later in the process, this knowledge helps the SBU not to optimize at the expense of other SBUs. [Ref. 9: pp. 300-302]

2. Building Consensus Around Strategic Objectives

The architect conducts 90-minute interviews with the senior executive team members (usually 6 to 12) to obtain input on the SBU's strategic objectives and tentative proposals for Balanced Scorecard measures across the four perspectives. Quite often one or two assistants to the architect augment this interviewing process. In addition to the input, the interviews serve as an opportunity to better introduce the concept of BSC to these senior

managers, respond to their questions, and translate how their input will be shaped into objectives and measures on the scorecard. This task also provides the architect an opportunity to learn about concerns and potential conflicts from or among key personnel. [Ref. 9: pp. 302-305]

At the conclusion of the interviews, the architect and his assistants reconvene to discuss the input. From this, a tentative list of objectives and measures is put together. The objectives within each of the four perspectives are ranked according to those most commonly mentioned during the interviews. Attached to each objective will be anonymous quotes from the individual executives explaining and supporting the objective, and bringing up potential issues for the executive team to solve. [Ref. 9: pp. 302-305]

The senior executive team now meets for their first workshop. In the beginning, the architect facilitates a discussion to gain consensus on the mission and strategy statements. Then, the senior executive team discusses each of the perspectives (customer, internal processes, learning and growth, and financial). At this time, the team members see all the proposed objectives, their rankings, and quotes from the interviews. Each objective is then discussed and compared with the other potential objectives. After all have been discussed, the group votes to determine the top three or four objectives in each perspective. A single sentence or short paragraph description is created for each objective, after which the team brainstorms for measures supporting the objectives. Next, the executive team is divided into four subgroups, each representing a

perspective. One executive is chosen to lead the subgroup and additional key managers are brought in to augment the subgroups. Soon after the meeting, the architect documents and distributes to the subgroups the objectives, their descriptions, and the potential measures. [Ref. 9: pp. 302-305]

3. Selecting and Designing Measures

The architect now begins a series of meetings with the subgroups to achieve four objectives. First, the subgroup must further improve the wording of the strategic objectives. Second, they must identify the measures that best represent the intent of each objective. Third, the subgroup must identify the information source for each measure and address the actions that will be required to access that information. Fourth, they must identify how measures are linked to one another within a perspective and how they are linked to measures in other perspectives. At the conclusion of these meetings, the subgroups should have completed a detailed description of each objective, a description of each objective measure, an illustration of how each measure is quantified and displayed, and a model of how the measures and objectives within the perspective and to those in other perspectives. With this accomplished, the architect schedules the next workshop. [Ref. 9: pp. 305-307]

At the second executive workshop, the lead executives from each subgroup present the results of their subgroup meetings. During these presentations, the proposals are further discussed and the development of implementation begins. Potential targets for the measures are also discussed. [Ref. 9: pp. 305-307]

4. Building the Implementation Plan

The subgroup leaders then convene as the implementation team to plan the linkage of measures to databases and information systems, the communication of the Balanced Scorecard to the organization, and the development of second-level measures (building blocks for the top-level measures) for subordinate units. [Ref. 9: pp. 308-309]

In the third executive workshop, the senior executive team finalizes the objectives, measures, and targets. Discussions also begin on the preliminary action plans to meet the targets. At the end, the team should agree on an implementation plan to communicate the BSC to the employees, to integrate the scorecard into its management philosophy, and to develop the information system required to support the scorecard. [Ref. 9: pp. 308-309]

Finally, it is recommended that management begin using the scorecard within 60 days of the final executive workshop. Even as a phase in plan will be required, the “best available “ data should be used until the information system has been established. Rollout of the scorecard project typically requires about 16 weeks. This includes time for the senior executive team to contemplate and reflect on the process that is occurring. [Ref. 9: pp. 308-309]

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IV. REORGANIZING

A. IMPETUS FOR CHANGE

The Marine Corps' logistical transformation effort began in 1998 when respected personnel from within and without the ranks of the Marine Corps came together to form the Integrated Logistics Capability (ILC). After significant analysis of best business practices in industry, the Operational Architecture (OA) Team (ILC sponsored) set out to reengineer the supply chain management process in the Marine Corps using the SCOR (Supply Chain Operations Reference) model as a framework. [Refs. 5, 7, 18]] In April of 2001, the Supply Chain Management Center (SCMC), Marine Corps Logistics Bases Command (MARCORLOGBASES), was established to provide a focal point for Marine Corps supply support. Previous to this, SCMC was known as the Life Cycle Management Center (LCMC) with an emphasis on weapons systems. The newly named organization then focused on the supply chain. SCMC's mission declared that it would "plan, organize, integrate, and manage Marine Corps worldwide supply chain activities for Principal End Items (PEIs), Secondary Items, and Consumable Items assigned to meet Marine Corps operational requirements." [Ref. 6: pp. 1-2]

Later, in June of 2001, Lieutenant General Gary McKissock (then Deputy Commandant, Installations and Logistics Headquarters, United States Marine Corps) stated, "the mandate for the Marine Corps' to change its logistical system is driven by the need to provide operational support to the Marine Corps' emerging Expeditionary Maneuver Warfare concept. This transformation, coupled with the

United States national industrial base modernization will radically alter the way the Marine Corps does 'worldwide logistical business' in the 21st century." [Ref. 8: p. 5] He would then go on to head a group of generals that developed the Marine Corps Logistics Campaign Plan (MCLCP) in 2002. [Ref. 11: p. 1] Within the plan, goals such as "streamlining the logistics chain" and setting "high standards of performance and striving to exceed them" were established to drive transformation efforts. Moreover, the Marine Corps Logistics Enterprise Integration guiding principles supported the MCLCP goals. Some of these principles included "developing an improved integrated logistics chain; accomplishing organizational transformation in the areas of Business Process Reengineering; documenting, analyzing, and validating Marine Corps logistics chain processes; and meeting user needs for valid, timely, and accurate information." [Ref. 8: p. 4]

Previous to, but in keeping with such identified goals and principles, DOD logisticians proposed that the "balanced scorecard" and the SCOR model be used to develop and evaluate the metrics and processes of the supply chain. [Ref. 2: p. 69] Balanced Scorecard would later be used by LOGCOM, beginning in May 2003; to develop performance metrics as will be described later in this document.

During its search for best business practices, the Marine Corps (via ILC) selected the SCOR model to be used to "identify gaps in its existing logistics chain systems portfolio as well as a baseline to acquire and develop new IT enablers or capability sets. It was chosen as the foundation of the logistics Operational Architecture (AO)

because it better aligned with industry leaders." [Ref. 8: p. 5]

In April 2001, having previously worked with the original OA Team and now leading the newly named supply chain-focused SCMC, the director of SCMC saw the SCOR model as a logical fit for the organization, so he began the steps toward implementation. A key factor that heavily influenced his decision was the fact that the OA Team's study of best business practices found that the SCOR model was the industry standard for defining and mapping the business processes/activities within an organization or supply chain. [Ref. 18]

In the end, SCOR was chosen for three reasons. First, it was being implemented to overcome the inefficiencies in interface processes encountered by the previous SCMC/LCMC organizations. Second, SCOR was being put into practice to solve the poor overall customer satisfaction that has characterized the Marine Corps logistics chain in the past. Third, SCMC chose SCOR for its other benefits, primarily improved cycle times and synchronized inventories (Wholesale, Retail). [Ref. 24]

Brigadier General Richard S. Kramlich (previous Commanding General, Marine Corps Logistics Bases) would later affirm that the SCOR model would be employed as the underlying foundation for establishing an enterprise-wide supply chain network within the Marine Corps and as the foundation for transforming and reorganizing the Supply Chain Management Center into the Supply Chain Manager for the Marine Corps. [Ref. 7: p. 2] In addition, this management tool was mandated in the updated DOD Super Reg, May 2003: "The DOD components shall use the supply chain

reference processes of Plan, Source, Make, Deliver, and Return as a framework for developing, improving, and conducting material management activities to satisfy customer support requirements developed collaboratively with the support providers." [Ref. 3: p. 19]

B. SCMC'S SCOR IMPLEMENTATION

Previous to their efforts to fully implement SCOR throughout its organization, the creators of SCMC's Centralized Secondary Reparable (SecRep) Project used the SCOR model methodology to achieve its goal. Prior to Sec Reps being centralized, the "As-Is" process for the individual Reparable Issue Points (RIPs) throughout the Marine Corps was to conduct their own P2 (Plan Source). To improve the process, SCMC took over Sec Rep P2 for the entire Marine Corps to support Fleet Marine Force (FMF) requirements (P4). The result has been the reduction of millions of dollars in inventory and of hundreds of dead lined Principle End Items (PEIs) and backorders at the RIPs. In completing the project, the Centralized SecRep Maintenance Department was established. Consequently, "the Centralized SecRep initiative served as a microcosm for the entire organization" as SCMC began its SCOR development for the organization as a whole. [Ref. 39] Since the transition to a SCOR-based organizational structure, the identified functions required for SecRep centralization have been integrated into their respective departments. The Supply Chain Planning Department now conducts all P2, P3, and P5 activities. The Source Management Department coordinates or conducts all M1 and S1 activities. Finally, the Material and Distribution Management Department

coordinates all D1, SR1, DR2, and DR3 activities. [Ref. 39]

In October 2001, a Master Sergeant was sent by the Director of SCMC to begin extensive SCOR training. He would later assume the role of SCOR "evangelist" for SCMC and perform the brunt of the facilitating within SCMC. In July 2002, having then retired from the Marine Corps and since converted to and been hired as a contractor by SCMC; the evangelist began the facilitation process. [Refs. 14, 15]

At this time, the evangelist formed an Integrated Product Team (IPT) consisting of all the directors of SCMC's "As-Is" departments and selected additional participants. The primary focus of this IPT was the alignment of people, processes, and systems in level four of the SCOR Project Roadmap. Nevertheless, during their weekly meetings, the IPT was led by the evangelist through an overview of the first three levels of the Roadmap. In order, each step of each SCOR level of the Project Roadmap was discussed each week at the IPT meetings. [Refs. 15, 24, 39]

Additional SCOR-trained personnel also assisted in facilitating during the IPT meetings, the IPT also proceeded to map out the first three SCOR levels of SCMC's general organizational "As-Is" processes (given that supply chains had still not been identified). In the future, this would facilitate the execution of the SCOR Project Roadmap as it more appropriately fit with supply chains. [Refs. 14, 15, 25, 39]

The IPT was also chartered to reorganize SCMC to be built around the SCOR model processes. This type of

implementation structure supported the DOD's most updated logistics publication, DOD Material Management Regulation 4140.1-R, and the SCOR-based Global Combat Service Support Marine Corps (GSCC-MC) system (the future Marine Corps logistics Enterprise Resource Planning tool), which supports the Operational Architecture being designed by ILC. Even one of the stated assumptions of the Operational Architecture is that the SCOR model will provide the basis for definition of its detailed layout. [Refs. 14, 15, 25, 39, 40]

During this time, a series of recommendations was developed and then culminated in a final recommendation that was approved by SCMC's Director in February 2003. However, the impending focus on Operation Iraqi Freedom proceeded to delay and slow down the implementation of the final approved recommendation. Finally, on 22 August, the "As-Is" organization (Figure 11) began to change as personnel were moved and departments were physically established for Plan, Source, Deliver, Data Management, and Enabler. (Figure 12) The Make or Maintain function continued to be managed by the Maintenance Directorate. In reorganizing by process function, SCMC sought to be more efficient and less redundant in their processes. Personnel were specifically assigned to departments during the earlier IPT meetings. As late as October, the departments were still discussing ownership of the Returns process. [Refs. 5, 7, 14, 15, 25]

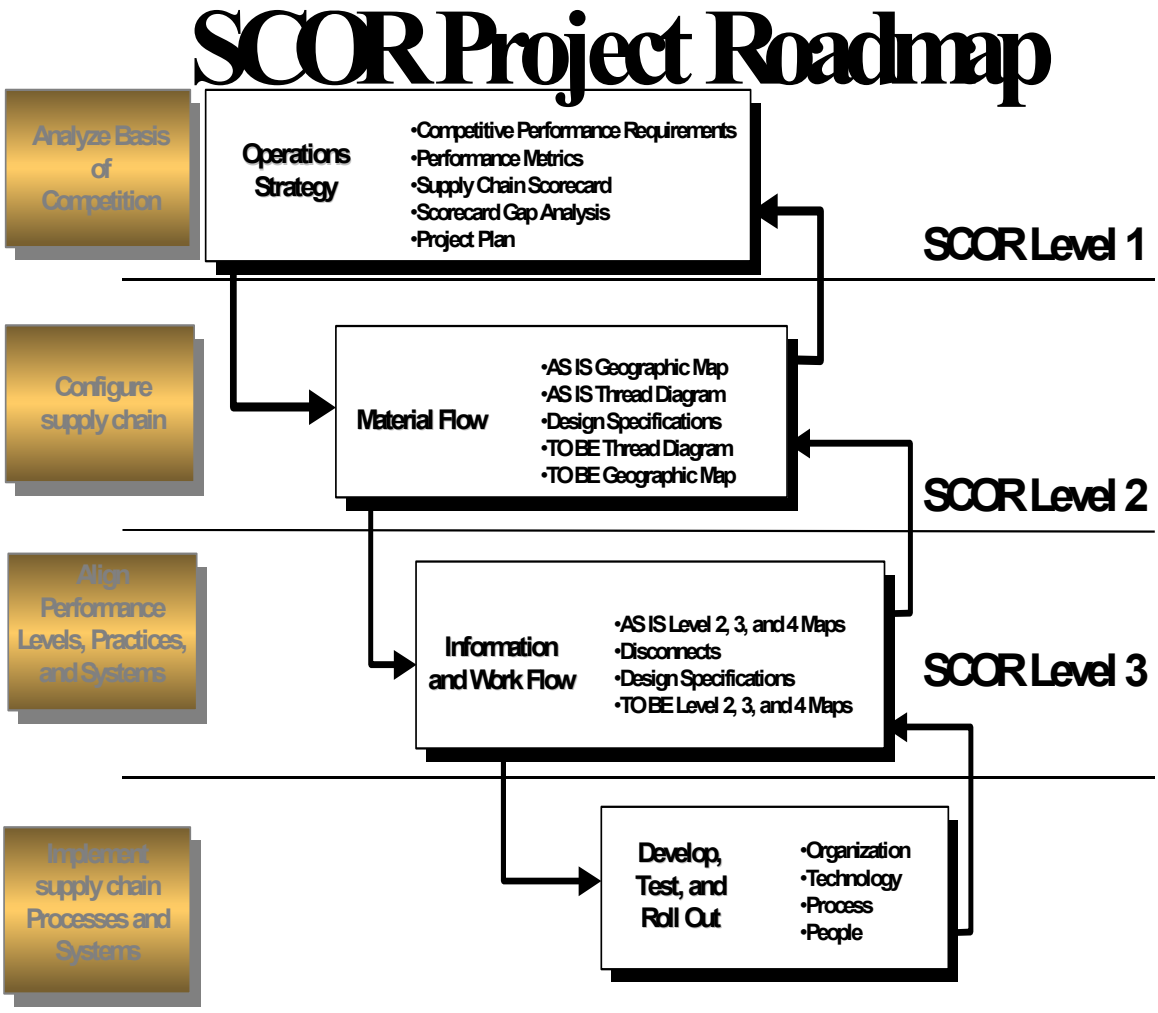


Figure 10. SCOR Roadmap (From: Ref. 23)

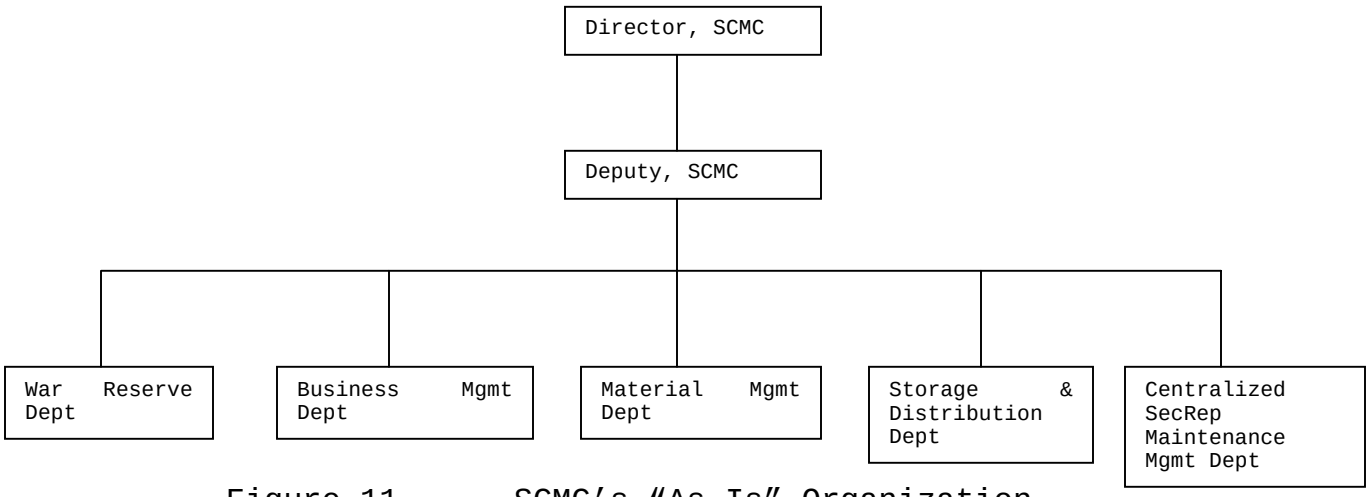


Figure 11. SCMC's "As-Is" Organization

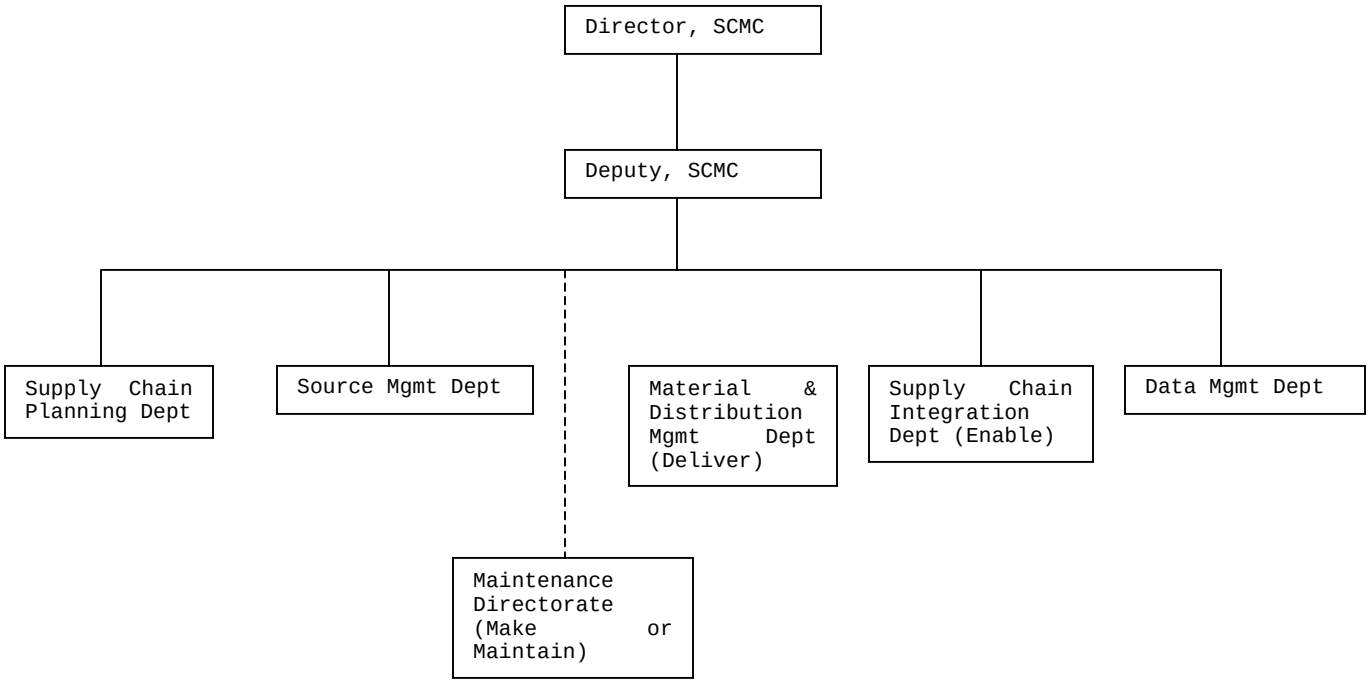


Figure 12. SCMC's "To-Be" Organization

Soon after physical establishment of the departments, some department IPTs began meeting to map out process levels four and beyond. Currently, this level of organizational mapping has been completed for some of the processes in M1, S1, and P3. To map such processes, the evangelist, other facilitators, and department supervisors met one on one with personnel to gain more detailed knowledge of the specific processes to be mapped. This preparatory work completed prior to the IPT session permitted a more fluid meeting to occur when actually mapping the process. Involvement of the personnel directly responsible for a process was a must. This was especially important as SCOR terminology significantly diminishes after level three. [Refs. 14, 15]

Thus far, in mapping the "As-Is" organizational processes, the following disconnects and gaps have been identified: [Ref. 7: p. 13]

- Supply chain planning activities were decentralized throughout the organization
- SCMC lacked a coherent capability to measure performance/execution of material management, distribution, and the overall supply chain
- SCMC lacked a coherent capability to manage supplier performance
- Customer relationship management was decentralized throughout the organization
- Material management and storage/distribution functions were not aligned

Again, it should be emphasized that SCMC, as of November 2003, was still mapping the general processes of its organization. Once completed, the organization's

process mapping, acting as a baseline, will greatly facilitate the efforts in mapping supply chains. Furthermore, in mapping individual supply chains, SCMC will be able to establish an “As-Is” baseline from which to work toward the “To-Be” objective. At this time, SCMC only had an aggregate data view of their inventory. In other words, SCMC cannot measure the performance of individual supply chains, only some of the performance of their entire inventory as a whole. [Ref. 15]

In reviewing what has occurred so far with the SCOR development process as of December 2003, SCMC has identified some things that went well as well as things that could have been done differently. Things that went well include the following: [Refs. 42, 47]

- Leadership support
- Logistics of reorganizing (e.g., staffing, physical movement)
- Documenting the “As-Is” processes
- Identifying metrics
- Applying the SCOR methodology to the recent “global sourcing plan” (In October 2003, during the reconstitution phase at the conclusion of Operation Iraqi Freedom, SCMC’s departments developed and have been executing a sourcing plan to meet the Principal End Item (Class VII) material shortfalls for seven Maritime Prepositioning Force ships.)

On the other hand, things that could have been done differently include the following: [Refs. 42, 47]

- Designed configuration of supply chains (e.g., trucks, suppliers, customers)

- Developed Corporate Supply Chain Strategy
- Established a shared information database
- Training (Supply Chain Management/Change Management/Strategic Process Management)

Despite these problematic areas, SCMC has been aggressively working to make the necessary adjustments and improvements. Rapidly recognizing its crucial role within SCMC, SCID has quickly adapted and recently formed a "Supply Chain Process Management" capability. Additionally, SCMC personnel have been actively communicating their transformation effort to the operating forces and the supporting establishment during all visits and conferences. [Ref. 42]

C. MODEL DEVELOPMENT IN SOURCE MANAGEMENT DEPARTMENT

When SCMC personnel moved to their assigned departments, a greater desire to map level four/five processes emerged as personnel saw that the reorganization had become a reality. The Source Management Department began to press forward in this respect, drafting four/five level process maps for two categories of S1 (Source Stocked Product) and the Warranty process. One week's worth of effort was required to complete one of SMD's level four/five process maps. [Ref. 15]

The Source Management Department (SMD) has been broken down into three branches: Source Enable and Assessment, Depot Maintenance Management and Execution, and Source Management and Contractor Logistics Support. Two of the branches were further delineated into sections. The Source Enable and Assessment Branch is comprised of the Source Enable/Business Rules Section and the Source

Assessment/Relationship Management Section. The Source Management/Contractor Logistics Branch consists of the Retail Source Management Section, the Third Party Logistics Management Section, and the Wholesale Sourcing Section. [Ref. 16]

To conduct the more detailed process mapping, SMD used the software program Microsoft Visio. Additionally, ISO (International Organization for Standardization) 9000's Post Production Systems Management Standard Procedure (PPSMSP) format was used to document the procedures of the process. Microsoft Visio is a flow chart program that maps the flow of activities within a process and puts the activities in swim lanes. The swim lanes demonstrate which department or organization is responsible for a given activity within their lane. Solid lines represent primary flows in a process; whereas, dashed lines represent secondary flows. Figure 13 demonstrates how Visio was used to map the draft version of Wholesale Sourcing (Procurement Buys) for S1. The mechanisms in the bottom swim lane indicate what technology or means were used to move from one activity to the next in the flow chart. PPSMSP is a common industry format used to capture procedures. The paragraph numbers used in PPSMSP have been inserted in the flow chart boxes in Visio for reference. The descriptions of the corresponding paragraph numbers are found in the draft version as shown in Appendix A. [Ref. 16]

For SMD's Source Enable and Assessment Branch and Source Management/Contractor Logistics Branch, the next critical step will be to map the Enable Source level four/five processes, to include: ES2 (Assess Supplier Performance), ES7 (Manage Supplier) Network, and ES9

(Manage Supplier Agreements). A draft version showing these level three processes can be seen in Figure 14. In past years, these processes have not been a focused effort and therefore are currently considered a vital disconnect in optimizing supplier performance. This author was asked by the Integration Department to provide recommendations regarding the metric development of these key processes, which will be addressed in the recommendations section later in this document. [Refs. 15, 16, 17, 21]

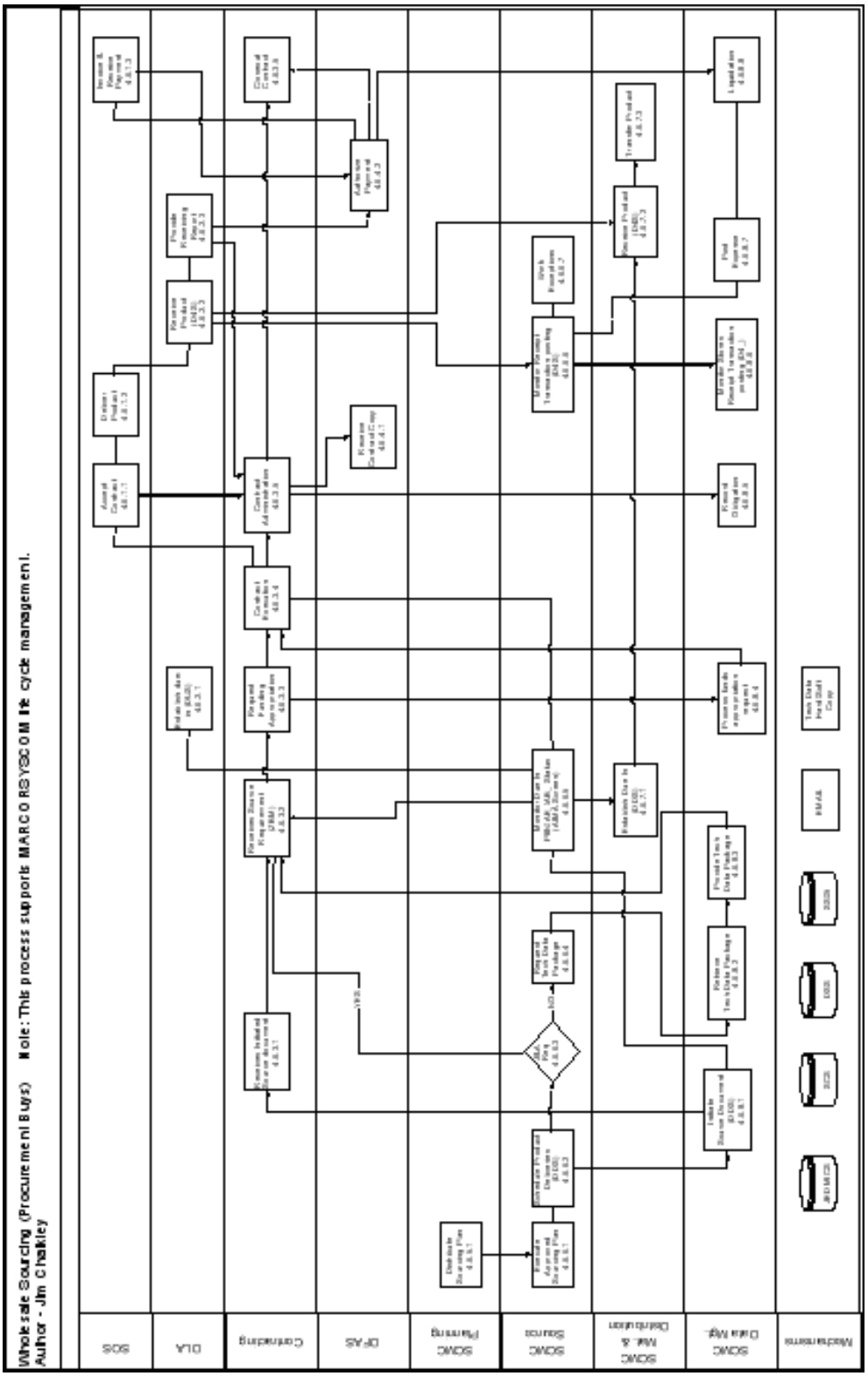


Figure 13. Procurement Buys Level Four Mapping and More (From: Ref. 29)

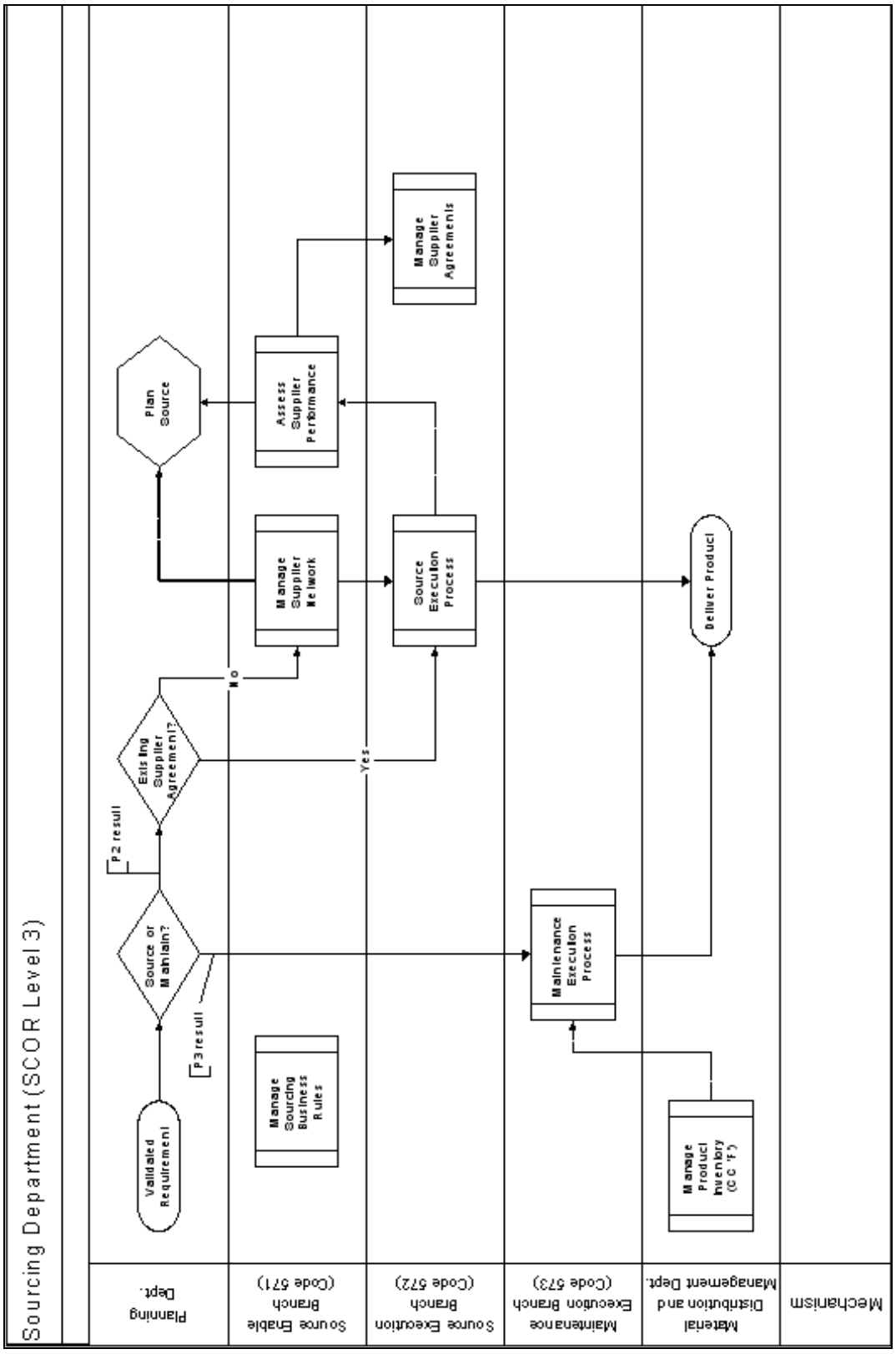


Figure 14. Level Three SMD (From: Ref. 29)

D. BALANCED SCORECARD IMPLEMENTATION

In 2002, Marine Corps Material Command and Logistics Bases Command began working separately with the Balanced Scorecard framework. In May 2003, Logistics Command (LOGCOM) was created with the merger of Material Command and Logistics Bases Command. The development of the Balanced Scorecard continued with LOGCOM. In July 2003, an executive core team (GM-15s, Colonels, and many subordinate leaders) convened to begin identifying objectives within the four perspectives that supported LOGCOM's vision and mission. Objectives were defined and potential supporting measurements were identified. After this session, the core team members (lower-level subordinate leaders) and subject matter experts were tasked with the following: [Ref. 41]

- Define the new measures and formulas
- Identify whether data is available to support the measures and where the data will come from
- Propose a target for each measure
- Propose initiatives needed to reach the targets
- Present proposal to the Executive Team for approval

Upon reconvening in August, the core team further developed and refined the objectives, the mapping relationships between the objectives, definitions of the objectives, measurements and their definitions. [Ref. 13] During the week of 8-12 September 2003, the Balanced Scorecard Collaborative assisted LOGCOM in "developing the reporting format and beginning the data collection identification process." [Ref. 13]

Throughout the remainder of September, then October, and into the first half of November, the core team members

continued collaborating together and with subject matter experts to better define strategic objectives, map relationships between the objectives, define objectives, and identify and define appropriate measurements and their targets. On 17 November, with the CG of LOGCOM in attendance, the executive core team reconvened for a second time to review core team progress and receive further guidance from the CG. From this meeting, the Director of SCMC returned with guidance to his subordinates to begin the data mapping, to revisit some of the strategic objectives and measures, to begin sourcing the data, and to brief him on these developments prior to the next executive core team meeting in December. [Refs. 26, 27, 28]

In the end, when the CG of LOGCOM gives the core team a “thumbs up” on their final Balanced Scorecard product, a cascading effect will then occur. SCMC will establish a core team to be responsible for delegating to the departments the measures and data required to provide for the scorecard. As this occurs across the various departments and sections throughout LOGCOM, the subordinate commands of LOGCOM will then begin providing data for the measurements in support of the objectives identified on the Balanced Scorecard mapping. The 14 November draft version of the mapping relationships of LOGCOM’s objectives can be seen in Figure 15. An example of an objective, its measure, calculation, and target can be seen in Figure 16, another 14 November draft version. [Refs. 26, 27]

LOGCOM
Vision: MARCORLOGCOM will be the preferred provider of supply chain management, depot level maintenance management, and strategic prepositioning to the Marine Corps and other Services and Agencies.
Mission: Provide worldwide integrated logistics/supply chain and distribution management, depot level maintenance management and strategic prepositioning management capability ISO the operating forces and other supported units to maximize their readiness and sustainability and to support Marine and Program-Level Total Life Cycle Management (TLCM).
Customer/Warfighter
Enhance our Focus on the Operating Forces
Improve Perfect Order Fulfillment
Provide Responsive Support
Sustain High Level Of Readiness
Provide "Best Value"
Internal Process
Logistics Enterprise Integration
Enhance Maintenance Centers – Enhance Prepositioning - Develop Log. Chain Team
Logistics Chain and MAGTF Integration
Enhance Logistics Planning
Provide Integrated Logistics Picture
Meet or Exceed Published Schedule
Provide Quality Service
Control Costs
Maintain and Recapitalize Infrastructure
Provide End-to-End LCM for USMC
Establish Communication Links
Learning & Growth
Promote Lifestyle Of Safety
Recruit and Develop Quality Civilian Marines
Improve Quality Of Life
Retain Marines and Sailors
Financial
Improve Working Capital Fund Financial Audit Credibility
Increase Revenue
Align Funding with Strategic Objectives
Optimize Capital Investment

Figure 15. LOGCOM Mapping (From: Ref. 26)

Customer / Warfighter Objective: SUSTAIN HIGH LEVEL OF READINESS

Objective Description: Improve our supply, maintenance and distribution functions impact on readiness. Increase our productivity in order to attain, sustain and reconstitute the quantities of materiel required to sustain operations. This applies to all classes of supply and results in increased readiness of individual weapon systems, as well as increased overall readiness of the total force.

Objective Owner: COL Rudolph
Measure Owner: COL Lopez

Measure: Equipment Condition (R) Rating Percentages

Calculation: MERIT R rating MARFOR MARES Reportable Equipment

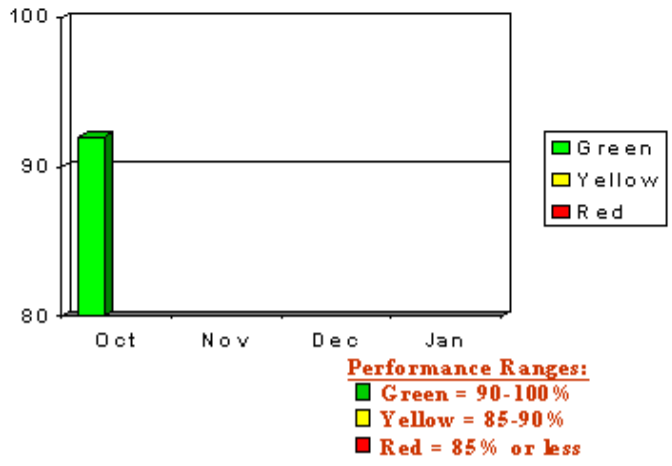
Data Sources: From S&A

Comments:

Represents overall rating for MARFOR as of 10-29-03.

This objective reflects the MARFOR "Equipment Condition (R) Rating Percentages" in MERIT. Only the TAMCNs shown on the MC Bull 3000 are reported in MERIT (approx 185 TAMCNs). Further drill down identified the MPB managed SDRs which were negatively influencing the readiness levels of MARFOR equipment. The following action has been initiated by SCMC to correct readiness degraders: *specific examples such as (1) changes to the master work schedule, (2) expediting long lead times, (3) etc.*

NOTE: The "R" rating = Possessed – Deadlined / Possessed



Measure Intent: (Measure to be divided up into two measure templates) Marine Corps Equipment Readiness Information Tool (MERIT) reports readiness rates on MARES reportable TAMCNs in the Marine Corps. This tool gives the user not only the ability to drill down to Equipment Repair Order (ERO) information on any MARES reportable TAMCN, but also provides aggregated readiness information on Marine Corps ground equipment from several different user selected perspectives and at any level from the battalion all the way up to the Marine Corps as a whole.

Long-term Target: 90%
Current Target: 85%
Actual: 92%
Freq: Monthly

Supporting Initiatives

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Figure 16. Objective, Measure, Target (From: Ref. 26).

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V. RECOMMENDATIONS

To address the sponsor's request for recommendations on assessing supplier performance and managing the supplier network, the author offers the following. Note that while these recommendations are informed by the research case just reported, they do not necessarily all follow directly from it. The goal of the research was an explanatory case study of the current state of the change process at SCMC. These recommendations are incorporated at the sponsor's request. The audience for the explanatory case study are those outside SCMC who wish to know more about the implementation of the SCOR model and the implementation of the Balanced Scorecard at SCMC. The audience for the recommendations is SCMC. Serving a dual audience in this way (with a divided document) would be unusual in a document whose sole focus was a research product (e.g., a thesis). However, it is one of the strengths of an applied MBA project that the project is more flexible; it can serve in this case both a descriptive research requirement, and a direct sponsor request.

A. REALIGNMENT

As SCMC has just been organized according to the SCOR model's five management process areas of plan, source, make, deliver, and return, SCMC should more distinctly transition into an organization based on supply chains, using the SCOR model for its primary purpose as designed by the SCC. In adapting to this organization, the Supply Chain Integration and Data Management Departments would continue as currently organized, to include SCID's new "Supply Chain

Process Management" capability (an opportunity to maintain functional integrity with plan, source, make, deliver, return cells through the development of guidelines based on current best practices and through the education of Weapon System teams). [Ref. 46: p. 234] However, the remainder of SCMC would be organized by Table of Authorized Material Control Number (TAMCN)/Commodities into departments of Alpha (Computer/Electronics), Bravo (Engineer Gear), Delta (Motor Transport), and Echo (Ordnance). The departments would be further broken down into Functional Area (FA) sections. Finally, each FA would be composed of Weapon System (WS) teams. The personnel currently working in the SCOR-based management process departments (Supply Chain Planning, Source Management, Material & Distribution Management) would be integrated into cross-functional WS teams. By transforming in such a way, SCMC would be more aligned down through the Intermediate Maintenance Activities (IMAs) to the weapon system owners (the warfighters). For years, the IMAs have already been organized by commodity: Motor Transport Maintenance Company (MTM), Engineer Maintenance Company (EMC), Ordnance Maintenance Company (OMC), and Electronics Maintenance Company (ELMACO). Despite SCMC's lack of jurisdiction, SCMC should also seek for the intermediate supply activities to also align themselves with the commodity-based IMAs, similar to what the Material Readiness Battalion in Okinawa has done.

Subsequent to this organization, the team leaders would then cross-train their personnel in all management process areas, as they now will have the resident expertise available in the teams to do so, and build more multi-

skilled teams. [Ref. 31] Concurrently, the teams would map the supply chains for their systems. This would align the warfighter completely through to the Program Manager, as well as the suppliers. In being assigned to a WS, these teams will also identify early on all of their Principal End Items (PEIs), Sec Reps, Consumables, and associated suppliers, manufacturers, and warfighters.

As the Supply Chain Manager of the Marine Corps, SCMC's weapon system teams would take the lead in managing the supply chain for their particular weapon system, to include all plan, source, make, deliver, and return management process activities. These teams will play a proactive role in identifying and meeting the supply chain needs of the warfighters, intermediate-level activities, depot-level activities, and even those of the program managers (especially as the PMs begin involvement in the development, test, and evaluation phases of new weapon systems).

To develop confidence in such a design, SCMC should quickly form at least a couple of weapon system teams and begin aggressive management of the supply chains of their weapon systems. As already mentioned, this initially means mapping their supply chains from suppliers completely through to the warfighter. The teams must know everything there is to know about their supply chains and be intimately involved in coordinating all plan, source, make, deliver, and return activities. These teams must also have the authority to act and make decisions quickly. [Ref. 31] This more apparent line of authority in the supply chain will further create a supply chain of personnel more

accountable for their weapon system and its performance (an opportunity to increase customer satisfaction among the warfighters). Consequently, the Marine Corps Equipment Readiness Information Tool (MERIT), which is currently providing readiness information based on TAMCN and FA, appears to be a logical medium through which to establish a performance metrics framework. Furthermore, Chief Warrant Officer-3 Chris Peterson has already begun working with MERIT's current developer, Concurrent Technologies Corporation (CTC), to discover, map, and prioritize all available supply and maintenance data; followed by identifying gaps and then enabling the pulling of information for subsequent performance measurements. [Ref. 32] In so doing, SCMC will then be better prepared to measure supply chains and provide data for a BSC "dashboard" (interface screen displaying the few key metrics for an organization), as units at Camp Lejeune, North Carolina have already successfully done with OROS technology software. SCMC should look to learn more about this implementation in order to potentially save themselves significant amounts of time and money. [Ref. 36]

Finally, the WS teams should also manage the Sec Reps participating in the 4th Echelon of Maintenance (EOM) Outsourcing program (a program whereby the Reparable Issue Point at the intermediate-level of supply sends dead lined Sec Reps in need of 4^{th} EOM through Raytheon [3PL contractor] to an outsourced supplier to be remanufactured) due to their specific supply chain ownership. [Ref. 32]

B. COLLABORATION

In the spirit of lean supply and the Collaborative, Planning, Forecasting, and Replenishment (CPFR) process,

the WS teams should develop collaborative relationships with the entire supply chain, most notably the suppliers, in order to lay the foundation for success. [Refs. 31, 33] To begin with, the WS team (working with the Contract Directorate) and its suppliers would lay out the ground rules in the form of a contract detailing price determination, quality assurance, ordering and delivery, proprietary rights, data to be shared, order minimums and multiples, lead times, safety stock rules, emergency order criteria, and order intervals, just to name a few. Furthermore, this joint agreement would be developed as a long-term contract of at least three to five years. This contract would create the foundation for a collaborative relationship facilitating future communication and coordination across the supply chain, some principles SCOR espouses in order to overcome inefficiencies. [Refs. 1,31, 33]

Second, the WS team would determine a demand forecast, communicate it to the supplier, collaborate together on the demand forecast, and then use it as a baseline for an order forecast. The key, prior to communicating the forecast to the supplier, would be to coordinate closely with the stock control officers at the intermediate and depot-level activities in order to receive the most valid demand information. In turn, these activities must work closely with the warfighters to most accurately create a demand picture based on operational schedule and key variables such as CAXs, deployments, and money; then provide demand forecast input to the WS team. Thereafter, the WS team would determine an order forecast following the same steps

as the demand forecast and then generate an order through the supplier. [Refs. 31, 33]

During a recent visit to the Naval Post Graduate School, the Director of the Defense Logistics Agency (DLA) stated that the Army could not give DLA a demand forecast prior to Operation Iraqi Freedom (OIF). This greatly increased the risk realized by the buyer (Army) and the seller (DLA). In the same light, SCMC's WS teams and their suppliers could greatly reduce risk by employing the CPFR process, in addition to decreasing inventory levels across the supply chain and increasing customer service responsiveness. [Ref. 33]

As mentioned previously with the contractual agreement, information should be shared and visible between SCMC and its suppliers, as well as the remainder of the supply chain. [Ref. 33] The MERIT system would likely be a good medium to employ in sharing information from the Marine Corps view, as all units can gain access to the system; and the system is already organized by TAMCN, FA, and WS.

Furthermore, the number of suppliers for a given system or component should be minimized, but sole source should be avoided except for highly complex components. In making such decisions, the suppliers need to be graded regularly according to predetermined performance metrics agreed to in the collaborative contracts. CPFR offers several potential metrics, which can be seen at their website. [Ref. 34] The grades will be visible to all suppliers, so they can view where they stand compared to other suppliers. Where performance is sub-standard in a

multiple supplier situation, a percentage of work should be shifted to another supplier until the sub-standard supplier's performance level has risen. This is done to prevent the suppliers from letting down on quality or deliver reliability. Again, these are all best practices recommended by SCOR, designed to increase supplier performance. [Refs. 1, 31]

Despite the minimal use of lean thinking and CPFR throughout the DOD, many DOD suppliers have begun implementing these principles. Moreover, the Office of Supply Chain Integration, via their DOD Supply Chain Management Implementation Guide, did include CPFR among its recommended logistics strategies for implementation. [Ref. 2: pp. 83-85] And, CPFR is currently a prominent best business practice in the SCOR model's planning section. [Ref. 1: pp. 15-16] SCMC should look to begin immediate implementation of these principles with some designated supply chains before following up with a complete rollout.

C. SUPPLIER ASSOCIATIONS

SCMC should consider creating a supplier association for key supply chains. This organization would include all of that supply chain's primary suppliers and key suppliers-of-suppliers. At least annually, SCMC would invite all members of the association to come together for a week in Albany, GA or another predetermined site. During this week, suppliers would disseminate important concepts that have helped make them successful, such as statistical process control (SPC), total quality control (TQC), value analysis, value engineering, and other cutting edge concepts. This sharing of ideas would help the performance of all suppliers. [Ref. 31]

D. ACQUISITION PROCESS

As many manufacturers and suppliers have discovered through the application of lean principles (in use for decades among Japanese automotive and electronics firms), much of the supply chain success should begin during the acquisition process when a new weapon system or PEI is added to the Marine Corps inventory. Realizing this may be beyond their control, the SCMC should still push the program managers at Marine Corps Systems Command to more fully consider logistics during the Integrated Product/Process Development (IPPD). A reliable system that does not break does not need to be repaired or spared. [Refs. 31, 35]

During development and testing, engineers from the various supplier tiers of the given system should be on site to identify and fix problems early to maximize reliability of the system and to save on life cycle costs and spares later. Even after regular production and distribution has begun, these engineers should be placed in the depots and possibly the IMAs to further identify and solve problems at the earliest possible time in the life cycle. Furthermore, all engineering designs should be shared early on throughout the tiers of suppliers to ensure a better, more reliable system in the end. [Ref. 31]

The contractual agreement spoken of earlier by the author would preferably be put in place during the acquisition phase to facilitate a better product and process from the beginning. [Ref. 31] This agreement would also include “smart shutdown” procedures (e.g., accounting for and maintaining all design drawings,

production equipment, and additional information to restart production). Given the Marine Corps' difficulty in obtaining repair parts for old and obsolete radios, this would be a preferred tactic. [Ref. 35] Also, to further prevent shutdown, the Marine Corps should be actively looking for trusted Allies interested in procuring the PEIs they use. In this way, continued production to meet foreign military sales would enable greater access to repair parts when they might typically be obsolete.

Currently, the Defense Acquisition University's (DAU) Research Fellows are researching and developing a "lean practices implementation process", due out in June 2004. All Post-Graduate Acquisition students at the Naval Post-Graduate School currently study the trilogy of "lean thinking" books (the Logistics students study only the second book), one of which has been referred to often in this document. Therefore, the beginnings of a "lean thinking" foundation, is being established among our officers, which could have a considerable impact in the future. SCMC should begin implementation of lean principles within their own sphere of influence and then push for our own Acquisition community to do the same when DAU releases their "lean practices implementation process" in June 2004.

E. CONCLUSION

Within this document, the SCOR model was introduced, as well as ILC's and Kaplan and Norton's BSC. There is significantly more literature that the reader would be encouraged to research. Additionally, the impetus for SCMC's change initiatives was discussed. SCMC's SCOR and BSC implementation steps were described. Finally,

recommendations were proposed to establish a foundation for successful metric development in assessing supplier performance. In the end, with the implementation of SCOR and BSC with the aforementioned recommendations, the three goals for implementing SCOR will be met:

- Overcome inefficient processes
- Solve poor overall customer satisfaction
- Improve supply chain performance (e.g., improved cycle times, synchronized inventories)

The author recommends that a study be conducted two years hence to determine the effectiveness of SCOR and BSC implementation in meeting those three goals.

APPENDIX A. MARINE CORPS LOGISTICS ATTRIBUTES: (REF. 4)

Where applicable and achievable, these six attributes and their associated metrics are currently being used as part of the Expanded Validation (EV) plan for ILC's Operational Architecture (OA). II Marine Expeditionary Force (MEF) units are presently participating. The units have been given guidance on what to measure, but not how. The "how" will be documented throughout and assessed later. As of 2003, the EV plan, which began in 2001, is still only in the beginning phase. Furthermore, not all of the identified metrics are being employed during the early part of the EV plan and not all have been defined. Nevertheless, as the EV plan progresses, the definitions, calculations, and source collection processes for each metric will be evaluated, documented, and adjusted where necessary.

1. Reliability: Quality Order Fulfillment

QOF= [# Repair Orders * %QOF (Maintenance)] + [# Requisitions * % QOF (Supply)]/[(# Repair Orders) + (# Requisitions)]

The % QOF (Maintenance) and % QOF (Supply) are tier-two metrics.

%QOF (Maintenance)= (# Orders Repaired Satisfactorily/ # Repair Orders) * (# Repair Orders Delivered By Agreed Upon Date/ # Repair Orders)

% QOF (Supply)= (#Orders Delivered Complete/ # Orders) * (# Orders Delivered By Agreed Upon Date/ # Orders)

All metrics used in the formulas to calculate % QOF (Maintenance) and % QOF (Supply) are tier-three metrics. [Ref. 4: Annex B]

2. Responsiveness: Total Supply Chain Cycle Time or Total Fulfillment Cycle Time (TFCT)

TFCT= (Request Cycle Time) + (Order Fulfillment Cycle Time)

Request Cycle Time (ReCt) and Order Fulfillment Cycle Time (OFCT) are tier-two metrics.

ReCT= Time elapsed prior to approval of the request

ReCT= Request Approved Date/Time – Date/Time of Request

OFCT= (Order Management Section Cycle Time) + (Maintenance Cycle Time) or (Purchase Cycle Time) or (Order and Shipping Time) + (Transportation Time)

Order Management Section Cycle Time (OMSCT), Maintenance Cycle Time (MCT), Purchase Cycle Time (PCT), Order and Shipping Time (OST), and Transportation Time (TT) are tier-three metrics.

OMSCT captures the time elapsed from when a request is approved at the supported unit until a requisition or repair order is created.

OMSCT= Requisition or Repair Order Created Date/Time – Request Approved Date/Time

MCT is the difference in time from when a corrective maintenance order is created and when the end item is ready to send back to the supported unit.

MCT= Date Repair Complete – Date Repair Order Created

PCT measures the requisition fulfillment cycle time for all requisitions that are not in stock when the order is received, and must be sourced through commercial or governmental agencies.

PCT= Date Requisition Ready to Ship – Date Requisition Created

OST measures the requisition fulfillment cycle time for requisitions that are in stock when the order was received.

OST= Date Requisition Receipted – Date Requisition Created

TT measures the time from when the product is ready for shipment until the time that the supported unit receives it.

TT= Date/Time of Delivery – Date/Time Ready to Ship

3. Flexibility: Logistics Chain Capacity or Fulfillment Capacity (FC)

FC is the capacity to which production, sourcing, and services can surge in order to meet a 20% increase in demand due to unexpected requirements.

FC consists of four separate tier-three metrics: Upside Make Capacity (UMC), Upside Warehouse Capacity (UWC), Upside Purchase Capacity (UPC), and Upside Transportation Capacity (UTC).

UMC measures the ability of the intermediate maintenance organization to surge the maintenance effort on a daily basis.

UMC= (Maximum Output – Output) / Maximum Output

UWC measures the ability of warehouse operators to surge to meet an increase in supported unit requirements. It is composed of two tier-four metrics: Upside Warehouse Space Capacity (UWSC) and Upside Personnel Capacity (UPeC)

UWSC measures the amount of excess warehouse space available for surge warehouse operations on a daily basis.

UWSC= Total Warehouse Space Empty / Total Warehouse Space

UpeC measures the amount of personnel time available for surge warehouse operations on a daily basis.

UpeC= (Total Hours Personnel Available for Work – Actual Hours) / Total Hours Personnel Available for Work

UPC measures the ability of the procurement management center to cover supported unit demand for items not held by the inventory manager.

UPC= [# of Line Items Required (Not Stocked)] – (# of Line Items Not Stocked but Covered by Contract) / # of Line Items Required (Not Stocked)

UTC is the percentage of transportation assets available to meet an unexpected surge in transportation demand, measured daily.

UTC= (Transportation Asset Hours Available – Transportation Asset Hours Used) / Transportation Asset Hours Available

4. Readiness: Operational Availability (Ao)

Ao represents the percentage of equipment that is mission ready.

Ao= Uptime / Total Time
or
Ao= Uptime / (Uptime + Downtime)
or
Ao= Uptime / (Uptime + TTR + SRT + DART)

Uptime and Downtime are tier-one metrics. TTR, SRT, and DART are considered tier-three metrics.

PEIs= Principal End Items

Total Time= number of days in the month * Total number of PEIs

Downtime= cumulative number of days PEIs had corrective maintenance tasks opened

Uptime= Total Time – Downtime

TTR= Time To Repair (The time an end item spends in the maintenance facility for corrective maintenance, and is not awaiting parts.)

SRT= Supply Response Time (Measures the amount of time maintenance waited for supply support.)

DART= Distribution and Administrative Response Time (The portion of downtime not attributable to TTR or SRT.)

5. Assets: Asset Utilization (AU)

AU describes the physical resources available to provide logistics supports.

AU is comprised of three distinct tier-two metrics: Maintenance Asset Utilization (MAU), Supply Asset

Utilization (SAU), and Transportation Asset Utilization (TAU).

Due to the metrics being separate components, close monitoring needs to occur to observe compensation practices and effects with the separate measures as they affect the aggregate measure.

MAU= [Maintenance Personnel Utilization (MPU) + Maintenance Workspace Utilization (MWU) + Maintenance Equipment Utilization (MEU)] / 3

MPU measures the percentage of time maintenance Marines spend doing maintenance activities.

MPU= Total Hours Spent on Maintenance / Total Hours Available

MWU measures the amount of space available to perform maintenance at any generic location.

MWU= Total Square Feet of Space Used / Total Square Feet of Space Allocated

MEU measures the amount of maintenance equipment being used against the total amount of maintenance equipment

MEU= Total Amount of Equipment Used / Total Amount of Equipment On Hand

SAU= [Supply Personnel Utilization (SPU) + Warehouse Space Utilization (WSU) + Inventory Utilization (IU)] / 3

SPU= Total Time Supply Marines Spend on Supply Tasks / Total Time Available Based on Total Supply Marines

WSU= Total Square Feet of Warehouse Space Used / Total Square Feet of Warehouse Space Available

IU= To Be Determined (Not yet defined, nor a calculation determined)

6. Expenses: Total Logistics Chain Expense or Total Logistics Expense (TLE)

TLE is captured to reflect how organizations apply financial resources to the maintenance, supply sourcing, and distribution efforts.

TLE is composed of Total Maintenance Expense (TME), Total Supply Expense (TSE), and Total Transportation Expense (TTE).

TME measures all financial resources applied to the maintenance effort.

TSE measures all financial resources applied to inventory management.

TTE measures all financial resources applied to distribution management.

APPENDIX B. SWIM LANE PROCESSES (REF. 21)

Wholesale Sourcing (Procurement Buys)

Actionee	Action	
		Note: This process supports MARCORSYSCOM life cycle management.
Commercial Source of Supply	4.6.1	Commercial organization responsible for accepting material and respond to directed requisitions to include; receive source requirement, provide status, deliver source product, issue billing adjustment.
	4.6.1.1	Accept Contract – Upon solicitation and satisfactory quotes received by Contracts Department, proposals are submitted. Inputs – Solicitation, DD 1155 Outputs – Signed contract Mechanism – DD 1155
	4.6.1.2	Deliver source product – The series of tasks including placing products onto vehicles, generating the documentation necessary to meet internal, customer, carrier and government needs, and sending the product to the customer in accordance with contract. Inputs – Shipping documents (DD 250) Outputs – Delivered product (with Government Bill of Lading (GBL)) Mechanism – DD 250, GBL Note: FOB/FOD will impact payment process.

4.6.1.3 Invoice & Receive Payment – A copy of the invoice is forwarded to DFAS for payment. Payment is received from DFAS upon payment authorization.

Inputs – Sourced product shipping documentation
Outputs – Payment
Mechanism – Document

DLA

4.6.2 Establishes due-ins and receive secondary items shipped by Commercial sources of supply (SOS).

4.6.2.1 Establish due-in (DUS) - As buys are released from SCS, “DUS” transactions will load a due-in record to DLA.

Inputs – DDS
Outputs – Due-in record (DUS)
Mechanism – DAAS, DSS

4.6.2.2 Receipt from Commercial SOS (DUS) – Material receipt.

Inputs – Due-in record (DUS), Sourced product
Outputs – Receipt verification (DD 250)
Mechanism – DSS, Shipping document (Signed DD 250)

4.6.2.3 Provide Receiving Report – DLA is required to provide signed copy of receiving report to Contracts, Source Management Departments and DFAS.

Inputs – Receipt verification (DD 250)
Outputs – Delivered receipt verification (Signed DD 250)
Mechanism – DD 250

Contracts Department

4.6.3 Receives source requirements, funding appropriation, executes and administer contracts.

4.6.3.1 Receives initiated source document – Data management department provides initial funding authorization, which authorizes the solicitation process.

Inputs – Document (Name?)
Outputs – Initial appropriation
Mechanism – Document

4.6.3.2 Receives Source Requirement (ZBM) – Funds were validated and approved.

Inputs – ZBM
Outputs – Solicitation authorization
Mechanism – SS05, Document

4.6.3.3 Request Funding Appropriation – Upon selection of supplier actual funding appropriation is requested.

Inputs – Source selection
Outputs – Request for funding
Mechanism – Document

4.6.3.4 Contract Execution – Includes solicitation, evaluation, source selection and contract award.

Inputs – Source selection
Outputs – Contract award
Mechanism – DD 1155

4.6.3.5 Contract Administration – Contract monitoring, problem resolution, and certifications.

Inputs – Contract (DD 1155)
Outputs – Performance review
Mechanism – DD 1155

4.6.3.6 Closeout Contract

Inputs – Certification
Outputs – Closed contract
Mechanism – DD 1155

DFAS	4.6.4	Receives copies of contracts, invoices, automated issue and receipt transactions that records and accumulates all data required for vendor payments, financial analysis of inventory movement and the control and account for cash resources as well as financial inventory balances.
	4.6.4.1	File Contract – Receives copy of contract in anticipation of making payment. Input – Copy of contract (DD 1155) Output – Contract on file Mechanism – DD 1155
	4.6.4.2	Authorize Payment – Receives invoice from contractor and makes payment in accordance with payment terms. Input – Certified invoice, Receiving report (DD 250) Output – Payment voucher Mechanism – TBD
SCMC, Planning	4.6.5	Establishes courses of action over specified time periods that represent a projected appropriation of supply resources to meet sourcing plan requirements. Distributes source plan to Sourcing Department for execution, along with supporting documentation (i.e. special projects letter of requirements, justification and approval (J&A), phasing plan, etc.).
	4.6.5.1	Distribute Sourcing Plan Input – Planning decisions and policies (Phasing Plan) Output – Sourcing plan Mechanism – SCS, Excel spread sheet, Word document

SCMC, Sourcing

4.6.6 Execute approved source plan (Procurement Buys), schedule product deliveries, request funding, monitor scheduled deliveries, monitor receipt transaction posting from storage activity, and as necessary manage exceptions.

4.6.6.1 Execute approved sourcing plan - Approved sourcing plan is received from Planning Department for execution. Ensure all necessary supporting documentation accompanies the Source Plan.

Input – Source Plan check list
Output – Validated Source Plan
Mechanism – Excel Spread Sheet, Word Document

4.6.6.2 Schedule Product Deliveries (DDS) – In SCS a DDS transaction will be utilized when submitting Procurement buys.

Input – Validated Source Plan, DDS induction
Output – Pending “MA” controlled exception (Suspended DDS), Funding request
Mechanism – Excel Spread Sheet, SCS, Printed copy “MA” exception

4.6.6.3 Justification & Approval (J&A) Required – To procure using other than full and open competition. Technical and requirement certifications must be complete prior to submission.

Input – J&A document
Output – J&A accepted by Contracts Department
Mechanism – Word Document

4.6.6.4 Request Tech Data Package (TDP) – TDP should be on file per planning process.

Input – Request for technical services
Output – Courtesy copy of response (no enclosure)
Mechanism – Email

4.6.6.5 Monitor Schedule Deliveries (AIMA) – Awaiting DDS with fund code from financial management. Upon contract award for a procurement buy a 'M67004' contract number (PIIN) is loaded to the wholesale due-in/shipment panel (AIMA).

Input – DDS with Fund Code, ZDS
Output – Due-in Record (AIMA), ZBM passed to SS17/SS05
Mechanism – SCS, DAAS

4.6.6.6 Monitor receipt transaction posting from storage activity - This includes monitoring required delivery dates, quantity received, condition code, etc.

Input – D4S transaction passed from storage activity.
Output – Updated/Closed due-in record, Asset quantity posted to TASSET (NSNC Panel)
Mechanism – SCS

4.6.6.7 Manage exceptions – All document identifier code (D4U) exceptions will be managed by Source Management department.

Input – Exception code – example (MA, SA, 1A, 1N, etc.)
Output – D4S
Mechanism – SCS

SCMC, Material and Distribution Management	4.6.7	Establishes due-ins with associated project code, receive, transfer secondary items shipped by Commercial sources of supply (SOS) for special projects.
	4.6.7.1	Establish due-in (DDS w/ project code) – Dues are established for special project requirements per planning agreements. Inputs – Procurement document (i.e. contract, MIPR) Outputs – Due-in record (DDS) Mechanism – MOWASP
	4.6.7.2	Receive Product (D4U w/ project code) – Material receipt (Commercial agency). Inputs – Due-in record (DUS), Sourced product Outputs – Receipt verification (DD 250) Mechanism – MOWASP, Shipping document
	4.6.7.3	Transfer accepted product to appropriate stocking location. Input – Inventory location Output – Special project inventory availability Mechanism – MOWASP
SCMC, Data Management	4.6.8	Responsible for initiating source document, retrieving technical data, providing technical data, processing funds appropriation request, recording obligations, monitoring stores receipt transactions, posting expense transactions, liquidating outstanding orders.

4.6.8.1 Initiate Source Document (DDS) – Initial source document passed to contracts department for the purpose of committing funds.

Input – T-Report (DDS “MA” exception)
Output – Initiated Source Document (Committed), ZBM
Mechanism – Word document, SCS

4.6.8.2 Retrieve Tech Data Package – Tech data packages reviewed during the source planning process and retrieved upon source execution.

Input – Retrieval request
Output – Tech data package
Mechanism – JEDMICS, Email, Document

4.6.8.3 Provide Tech Data Package – Tech data packages forwarded to Contracts Department to support procurements.

Input – Tech data package
Output – Tech data package acceptance
Mechanism – JEDMICS, Email, Document

4.6.8.4 Process funds appropriation request – Fund request are submitted by Source Department in accordance with phasing plan.

Input – Funds request from Contracts Department
Output – Appropriated funds
Mechanism – Document

4.6.8.5 Record Obligation – Obligations recorded upon award of contract.

Input – OBL transaction
Output – Recorded obligation (OBL)
Mechanism – SABRS

4.6.8.6 Monitor Stores Receipt Transaction posting (D4_) – Receipt transactions monitored to ensure Stores Accounting System updated.

Input – D4_ transaction
Output – Updated Stores Account
Mechanism – SABRS

4.6.8.7 Post Expense – Expense transactions identifies receipts to financial management system.

Input – EXP transaction
Output – Expense posted
Mechanism – SABRS

4.6.8.8 Liquidation – Liquidations closes outstanding orders.

Input – Matching obligation, Expense, Payment
Output – Liquidation
Mechanism – SABRS

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LIST OF REFERENCES

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